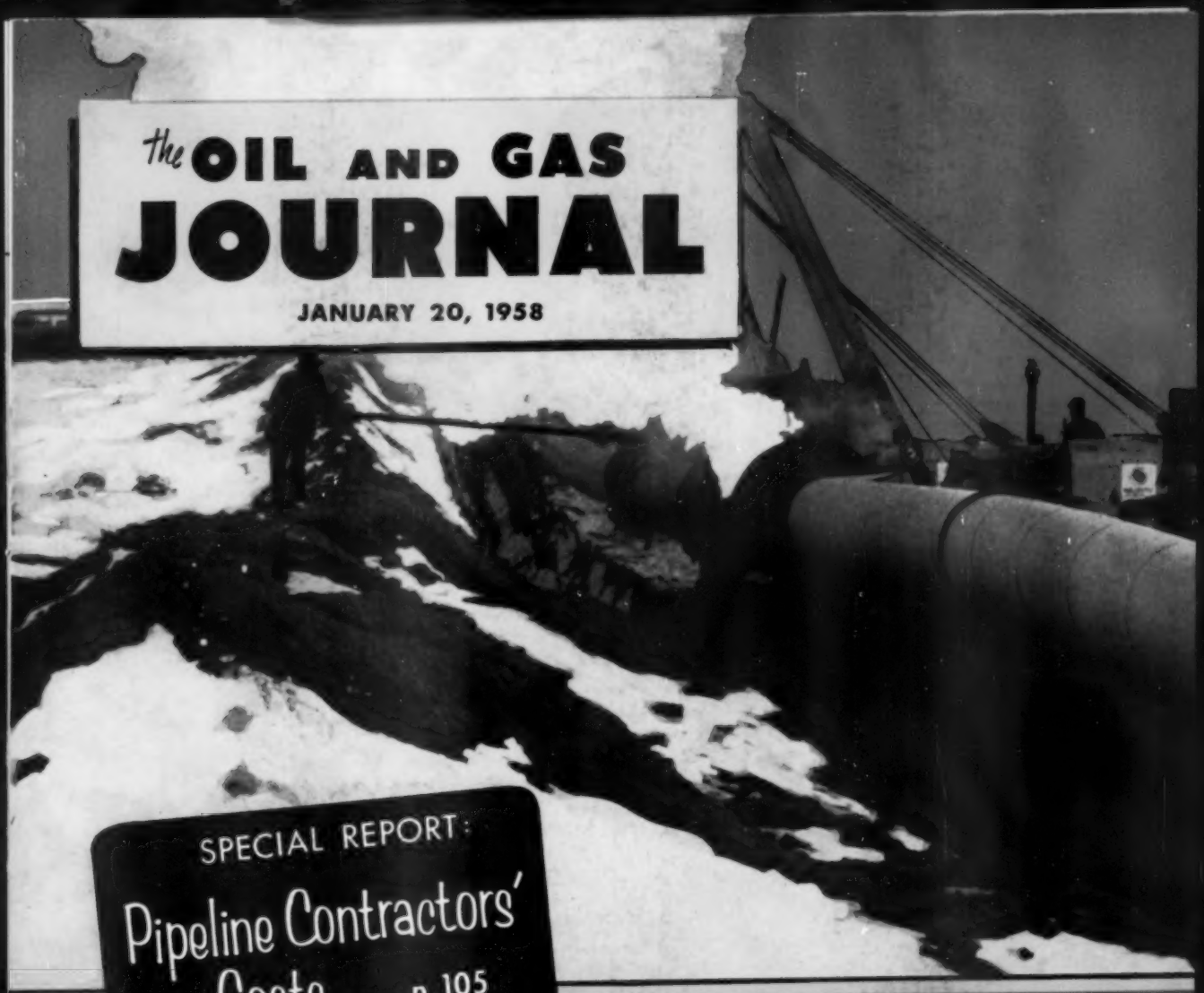
the OIL AND GAS JOURNAL

JANUARY 20, 1958



SPECIAL REPORT:
Pipeline Contractors' Costs.... P. 105

Oil Is No. 1 Industrial User of Radio P. 82

Short Cut to Calculating Regenerator Heat Balance P. 121

What We Know NOW About LACT P. 130

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the OIL AND GAS JOURNAL Newsletter

Jan. 20, 1958
Tulsa, Okla.

New Journal study of pipeline construction is an eye opener:

All was not gravy for the contractors in the 1957 boom year. Men in the business describe the last 12 months as a high-volume, but low-profit year (p. 105).

One fact stood out: Plenty of jobs came up, but there were more than enough spreads available to handle them.

Profit squeeze on pipeline builders shapes up like this:

...Labor is up 22 to 25 per cent since 1952.
Hourly wages in 1952, for instance, ranged from $1.53 to $2.73. By 1957 they were $1.98 and $3.41 (p. 110).

...Equipment costs rose 26 per cent in same period.
Cost of putting a big-inch spread in the field in 1952 was $1,300,000. Spread required for the same job last year cost the contractor $2,100,000.

...Prices received by the contractor rose 12 per cent.
The average price for 20-30-in. jobs in 1952 was $2.45 per foot. It increased to $2.72 per foot in 1957 (p. 112-118).

This improvement was mixed, however. Strangely, the large-diameter and small-diameter jobs took the largest percentage jump in prices. Intermediate-diameter jobs (10 to 26-in.) showed very modest increase. Two categories (18 and 20-in.) actually were down.

The explanation: Competition was less in the small and big jobs, more brisk in the intermediate sizes.

What do pipeline contractors say is needed?

...Costs must be viewed more realistically by each outfit in making job bids. Many need to update their cost sheets. A 10 per cent boost in prices would be reasonable.

...Companies using contractors' services should look into ability of bidder, favor competent firms over the fringe contractor.

Two pipeline jobs to watch:

...Texas Panhandle refiner, looking for wider product markets, expects to ship into Mid-Continent later this year

if round-about pipeline arrangements can be made.

...Transwestern Pipeline reportedly is wrapping up its plans for big-inch gas line from West Texas to California. Announcement of details on entire project will come in spring.

Uniform specifications for pipeline crossings of railroads and highways are due early this year.

Special committee of pipeline division of American Society of Civil Engineers soon will present draft of proposals to various industry groups for approval.

Report is being timed to precede specifications now being drafted by various state highway departments in connection with federal highway program.

Acceptance of the plan by industry and government could eliminate costly confusion arising from different specifications in various states.

Expect more and more lease automatic custody transfer units to make their appearance.

This new technique has snowballed in the last 2 years. Its bright future rests on these proven points:

LACT units work. They can save money.

Payout is surer if you install LACT when building a new battery or replacing an old one.

P.d. meters are winning favor for volume measure, but there's plenty of room for other types.

Needed: A cheap, sure way to get b.s. and w. and gravity accurately without an automatic sampler (p. 130).

Oil is the biggest industrial user of radio.

This amazing growth is bringing some special problems and is giving the oil industry a stake in FCC plans for future regulations (p. 82).

Three pressing problems currently are in forefront:

1. Heavy microwave use may bring on tighter regulation.
2. Changes in lower frequencies also are under study.
3. Common carriers are moving into the picture.

Special case study by a Journal editor in this connection shows how two-way radio is proving a big saver for Reed Drilling (p. 138).

The privately owned system has reduced rig down time, cut wear and tear on company cars, sliced long-distance phone bills, tied rig and home office closer together, and provided additional service to the operator.

Government will find conditions changed if it opens new lands under the Gulf of Mexico for leasing this year.

For one thing: Day of $2,000 an acre bonuses is gone.

This was pointed out by Howard A. McKinley, regional land superintendent of Continental Oil in speech before the

Gulf Marine Service Association in New Orleans.

McKinley said offshore area will price itself out of the market if high prices persist.

Tokyo wants to import LPG for domestic fuel.

Tokyo City Gas Co. already is talking to Caltex, Standard-Vacuum, and Shell about the possibility.

The Japanese utility has been plagued by gas poisoning cases arising from high carbon monoxide content of its manufactured gas.

Its economists figure LPG can be imported at 60 per cent of current cost of producing gas from heavy fuel. Besides the carbon monoxide content will be lowered by more than 6 per cent without losing any heat content.

Here's how Eisenhower's budget involves oil:

...Receipts from oil taxes will be up.

Gasoline tax will bring in $1.71 billion against $1.64 this year. Lube-oil levy will take in $76 million, up $1 million. Pipeline transportation will add $40 million more, also a $1-million rise. Diesel-fuel tax means $55 million, up $8 million. Royalties on natural resources will top $88.5 million. a slight increase.

...Interior's funds for oil activities will drop by $945,000.

...Fuel for Navy and Air Force will cost more than $730 million, a slight dip.

...Cost of regulating the industry also will rise. FPC will spend $3.2 million for regulating natural gas. And Justice Department will spend $3.79 million in antitrust work (p. 77).

West Coast is facing up to an oversupply situation.

Stocks of crude and products have reached a postwar high. Storage is becoming tight. Decline in domestic, overseas, and military demand are blamed for the plight.

This explains why Socal last week cut its own crude production by 10,000 bbl. daily. Earlier cuts were made by Union (5,000 b/d) and Richfield(3,500 b/d), with General Petroleum expected to follow with a 2,500-bbl. cut.

The trouble will start backing up, too.

The New Mexico Oil Conservation Commission was told last week the West Coast oversupply makes marketing prospects for San Juan basin oil through Four Corners pipeline "not too bright at present."

The imports problem won't lie still.

Plans of 18 gulf and East Coast firms to import foreign crude are raising serious threats to voluntary controls.

Imports Director Carson has set hearings on their requests next month. He has not revealed volumes of crude involved but says the total could jeopardize import controls.

A new importer, Superior Oil Co., apparently is finding a ready U. S. market for its Lake Maracaibo crude.

Superior has more flush production in Venezuela than any other newcomer to the country. But for a time it had no place to take its crude.

Superior President Keck now says he has contracted to sell 10,000 bbl. daily and expects to wind up at least two more purchase contracts in the U. S. this month.

Mid-Continent refiners, meanwhile, are worried about reports that foreign oil is now moving up the Mississippi by barge to a Memphis refiner.

Price reportedly is $2.75 bbl. delivered in Memphis.

This is under price Oklahoma refiners must pay in the field. Their products, which have to be shipped to the river by pipeline, thus have small chance to compete at such a big disadvantage.

Refiners should watch these trends in 1958:

Acrolein is a possible comer in petrochemicals.

New derivative of refinery gas will be mass-produced in a new plant Shell Chemical is building at Norco, La.

First use will be in making glycerin.

This looks like a year for alkylation in motor fuel.

Many refiners, both large and small, are planning to install alky units. Biggest activity since World War II is taking shape.

New facilities appear divided about evenly between the sulfuric and hydrofluoric acid process types.

Look for some new revelations on Ethyl Corp.'s new TEL supplement, AK-33X.

Patents have been issued to Ethyl for the specific additive and for general class of compounds it represents. Testing in motor fuel is well started.

Latest on fuel injection indicates it permits engine to operate on lower octane fuels without knocking.

But advantage isn't spectacular. There's no difference noted in road economy or miles per gallon. Under this condition, payout is long for a $500 fuel-injection system.

Exploration notes: Colorado may join Paradox basin producers if tests at 1 Government in Montezuma County prove out. ...Amerada apparently has a Silurian discovery on west flank of Nesson anticline in McKenzie County, North Dakota....Sunshine Mining is going back to rank wildcatting in efforts to make Washington more than a one-well state. It plans wildcat 5 miles south of its 1 Medina...New Bolivian concession covering 2,223,900 acres has been granted three U. S. independents, White Eagle International, Blackwell Oil & Gas, and Western Petroleum, all of Tulsa.

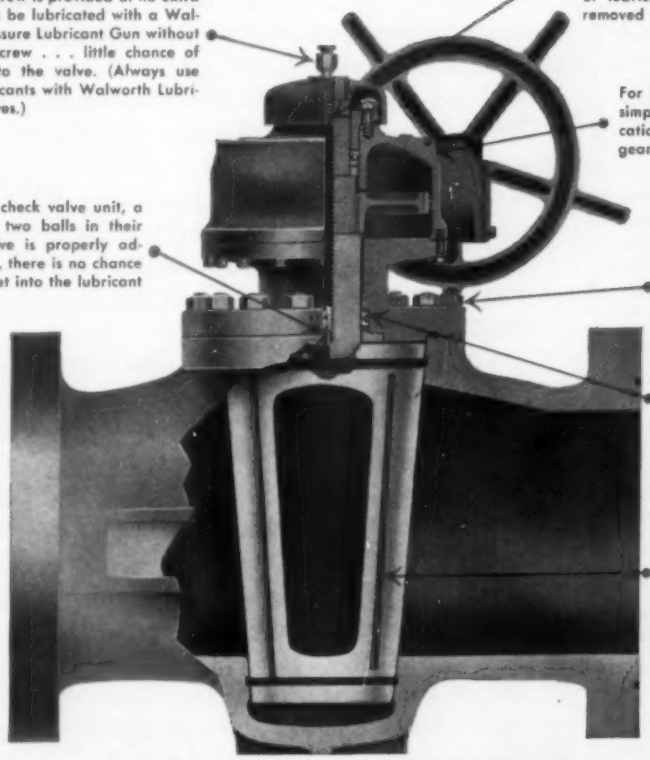
Let's get technical about WALWORTH LUBRICATED PLUG VALVES for pipeline service

Combination button-head lubricant fitting and lubricant screw is provided at no extra cost. Valves can be lubricated with a Walworth High Pressure Lubricant Gun without removing the screw . . . little chance of grit getting into the valve. (Always use Walworth Lubricants with Walworth Lubricated Plug Valves.)

An added safety feature in the form of a groove cut part way up side of the lubricant-fitting screw allows the operator to observe any tendency of lubricant to blow out *before* the screw is removed entirely.

For buried pipelines — yoke design permits simple attachment of handwheel and lubrication extensions without modifying the gearcase.

In the stainless steel check valve unit, a transverse pin holds two balls in their seats. When the valve is properly adjusted and lubricated, there is no chance for line pressure to get into the lubricant system.



Standard bolt threads, rather than fine threads, mean easy replacement of nuts and bolts from local stocks.

Two overlapping Teflon packing rings form an effective seal against possible leakage without "grabbing" the plug shank. Low breakout torque . . . plug turns easier. Packing serves only as a seal and is not used to hold the plug in its seat.

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Cutaway of a 24-inch Walworth Lubricated Plug Valve

Without exception, a Walworth Ball Bearing Lubricated Plug Valve is easier to operate and maintain than any other type of rotary-action, sealed valve available today for pipeline service. Design features pointed out here show just a few advantages of Walworth Ball Bearing Lubricated Plug Valves.

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The Oil and Gas Journal, published Mondays, copyright 1958, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

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Annual Index Now Being Distributed

JOURNAL SUBSCRIBERS who want a copy of the annual index may obtain it immediately by sending a post card request to The Reader Service Department, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

The index, now off the presses, contains a list of stories and articles printed in The Journal during 1957.

OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
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TECHNOLOGY—OPERATION

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By Paul Reed and Gene Kinney

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A comparison of total costs, 1952 with 1957.

How Major Equipment Costs Have Risen in 5 Years 108

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Wages are up from 20-25 per cent over the 5-year period.

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By O. A. Wunderlich and F. Emerson Ivey, Jr.

An eight-page foldout using a graphical solution for the heat balance. The solution provides a readily understandable and usable relation of the variables.

New Cost Control Methods in Refining 140

By J. W. Davis and P. P. Entriken

Esso Standard is using an IBM 705 computer to carry out cost control operations. The computer-implemented program can often make a diagnosis of specific cost factors and recommend the best treatments.

On The Job . . . Plants and Fields 144

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It works and can save money; more and more units are coming; payout is surer on a new battery; p.d. meters are popular for volume measurement; and an automatic sampler is needed for b.s. and w.

Two-Way Radio System Steps Up Rig Efficiency 138

By Norman S. Morrisey

Reed Drilling Co. has increased rig efficiency by the use of a two-way privately owned radio system. Results are reduced down time, decreased phone bills, and smoother field operation.

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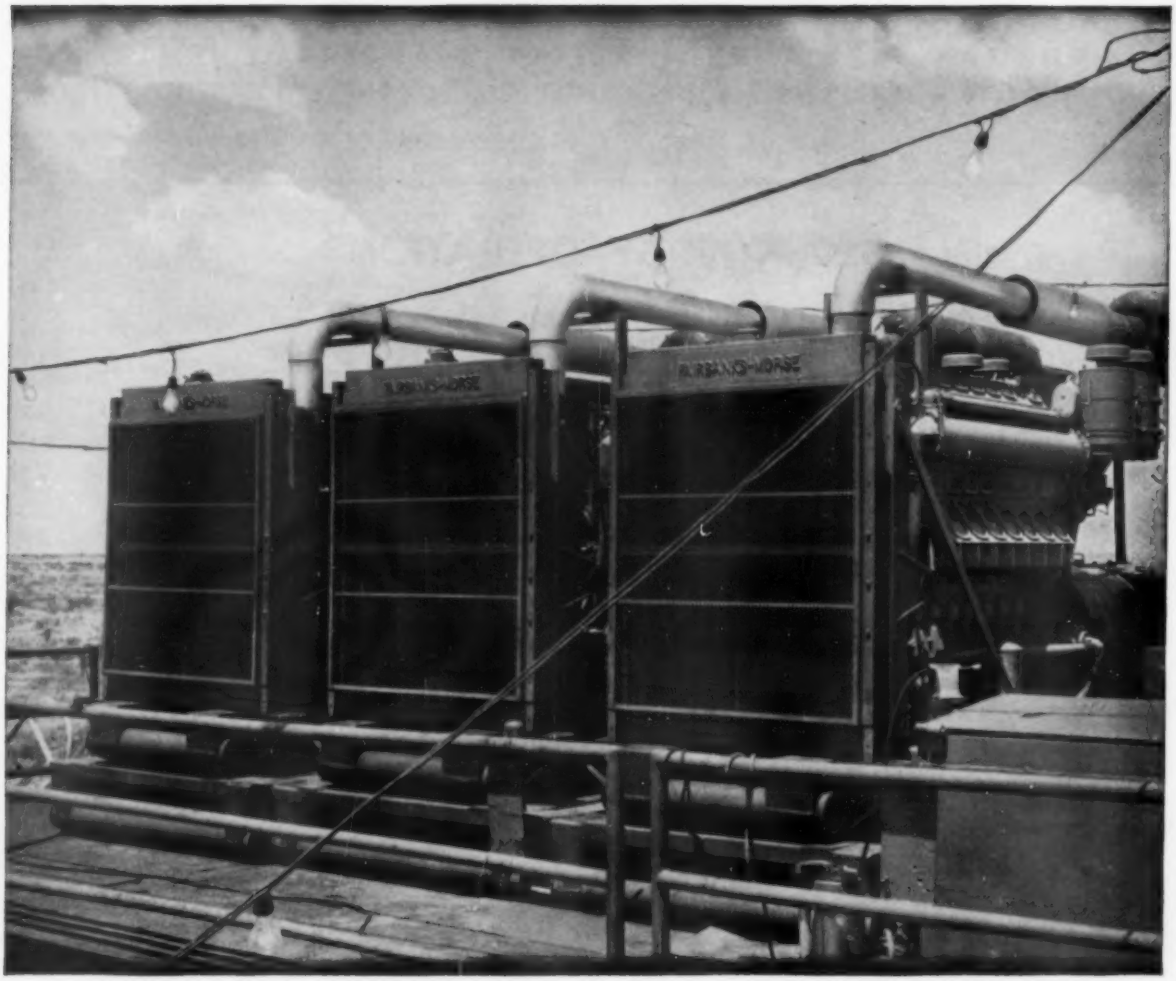

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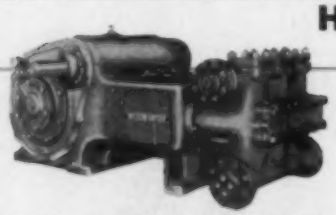

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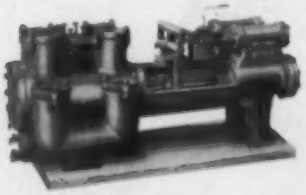

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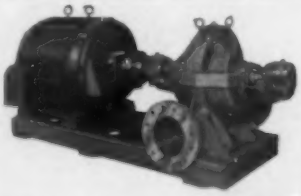

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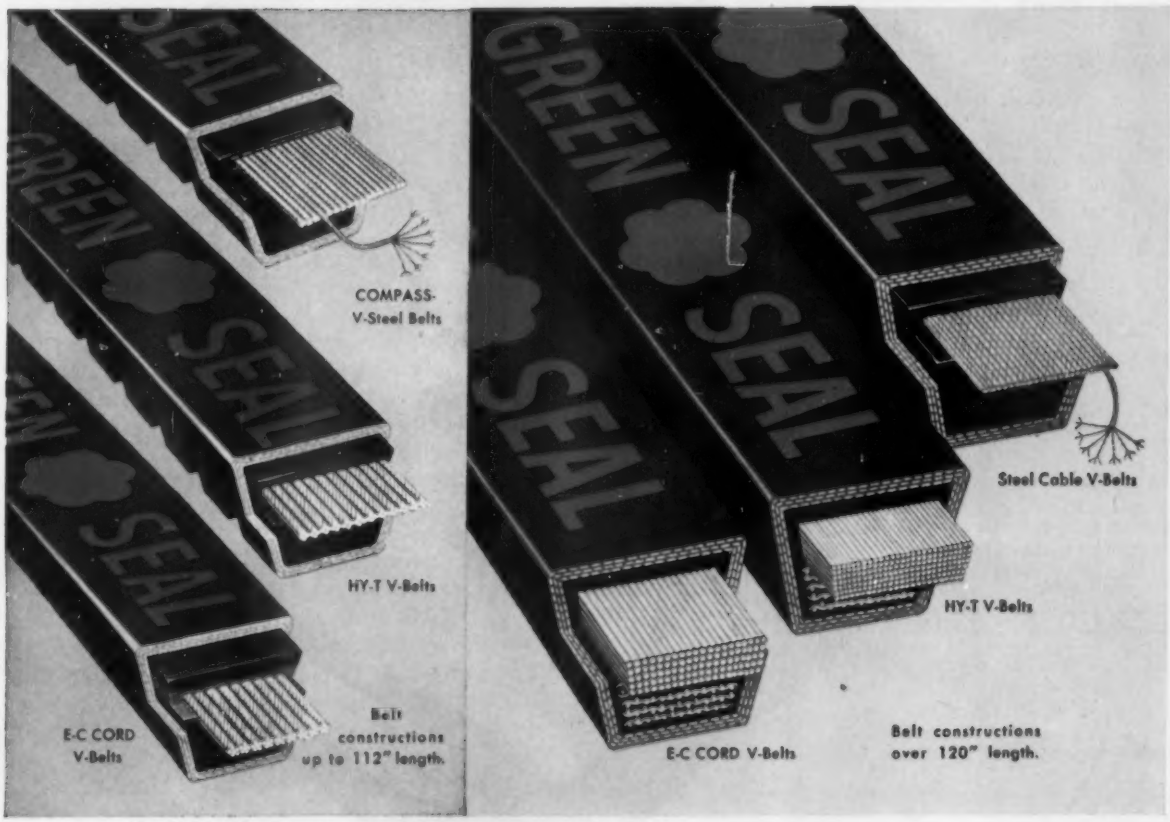

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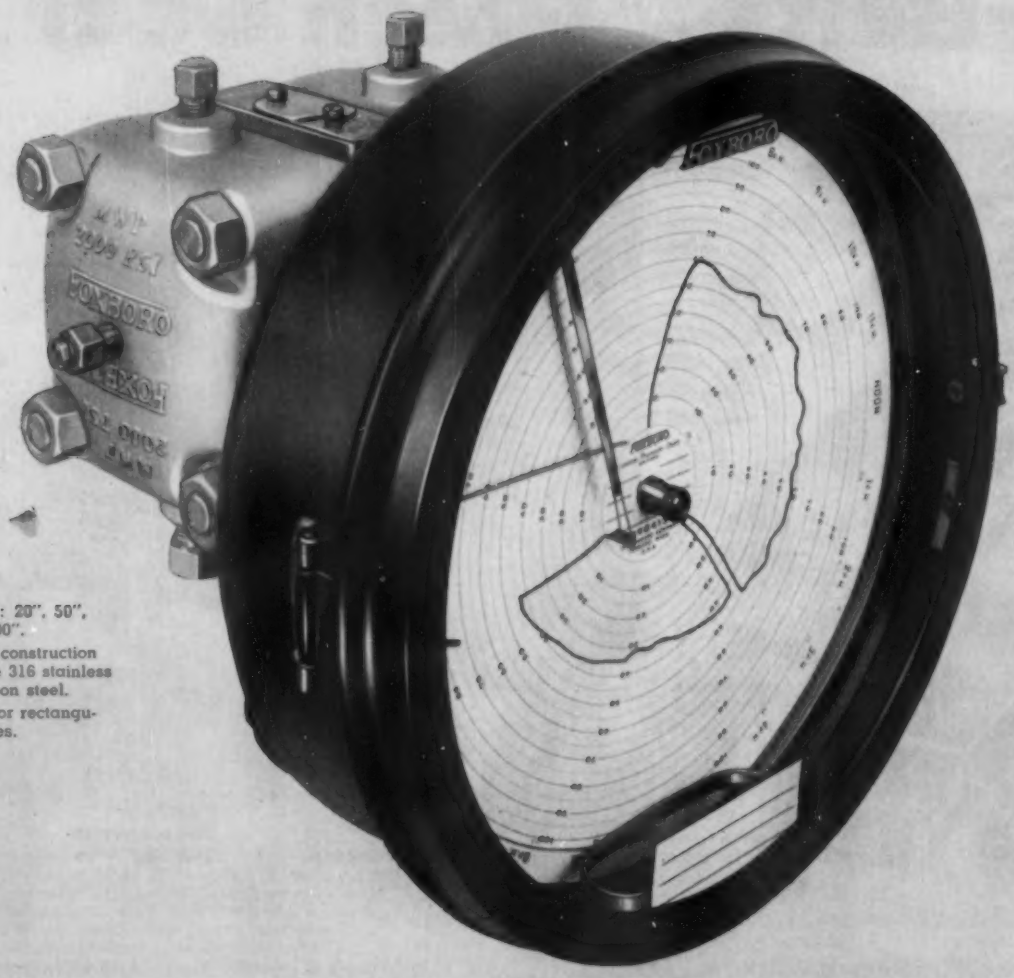

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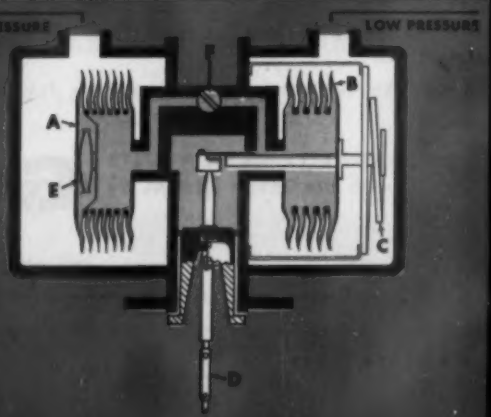
...the new Foxboro Type 37 Diaphragm Meter

How It Works

In schematic drawing at right, areas shown in color represent a stable, non-freezing liquid. Any pressure increase in the high pressure chamber compresses Diaphragm Unit A, displacing its liquid and expanding Diaphragm Unit B until force of Range Spring C equals the difference between the forces on Diaphragm Units A and B. Linear motion of Diaphragm Unit B moves inner end of Drive Bar D — outer end moves correspondingly through the bellows-sealed flexure bar, driving pen arm. Built-in Temperature Compensator (E) proportionately adjusts diaphragm capacity as ambient temperature variations affect volume of filling fluid. External damping adjustment is shown at F.



• complete overrange protection!

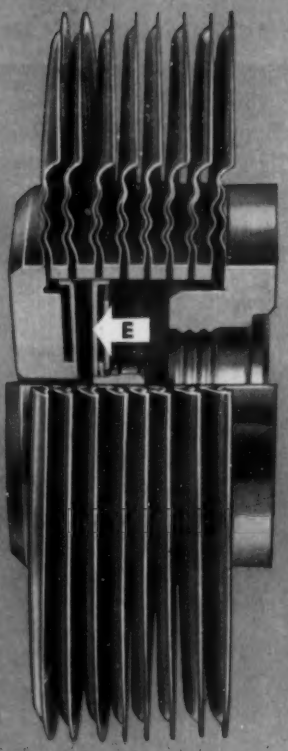
• sustained high accuracy!

Now you can have mercuryless flow measurement for a wide range of differential pressures — at static pressures up to 2000 psi — with greater safety and dependability than ever before! The new Foxboro Type 37 Diaphragm Meter not only combines unmatched ruggedness and precision in a dry meter — it's by far the easiest to adjust and maintain. And it does away with zero drift problems, once and for all! Expansible, Type 316 S.S. diaphragm elements respond to changes in pressure with unmatched sensitivity, yet are completely immune to overrange up to full static pressure! A unique packless drive bar precisely transmits linear motion to the pen arm. Range-changing is easy, due to new twin-spiral spring design. Wide range damping is externally adjustable under pressure. And the Type 37 is self-compensating for temperature changes in all differential ranges. Get full details on this high utility, completely dependable dry flow meter. Arrange for a demonstration with your nearby Foxboro Field Engineer, or write The Foxboro Company, 601 Neponset Ave., Foxboro, Mass., U.S.A.

FOXBORO

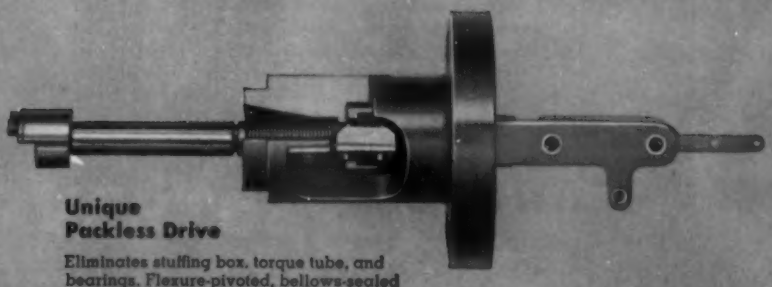
REG. U.S. PAT. OFF.

FIRST IN FLOW METERING



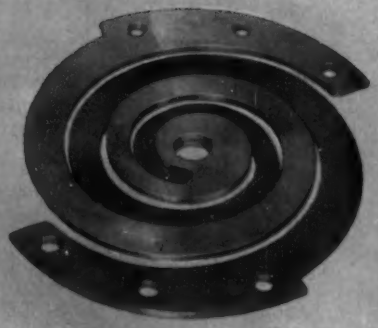
Exclusive Diaphragm Elements

Type 316 S.S. diaphragm units in both high and low pressure chambers provide greatest linearity and freedom from hysteresis; nesting design and integral spacer rings provide safe, positive, overrange protection. Temperature compensation (E) is built into diaphragm assembly . . . never requires change or adjustment.



Unique Packless Drive

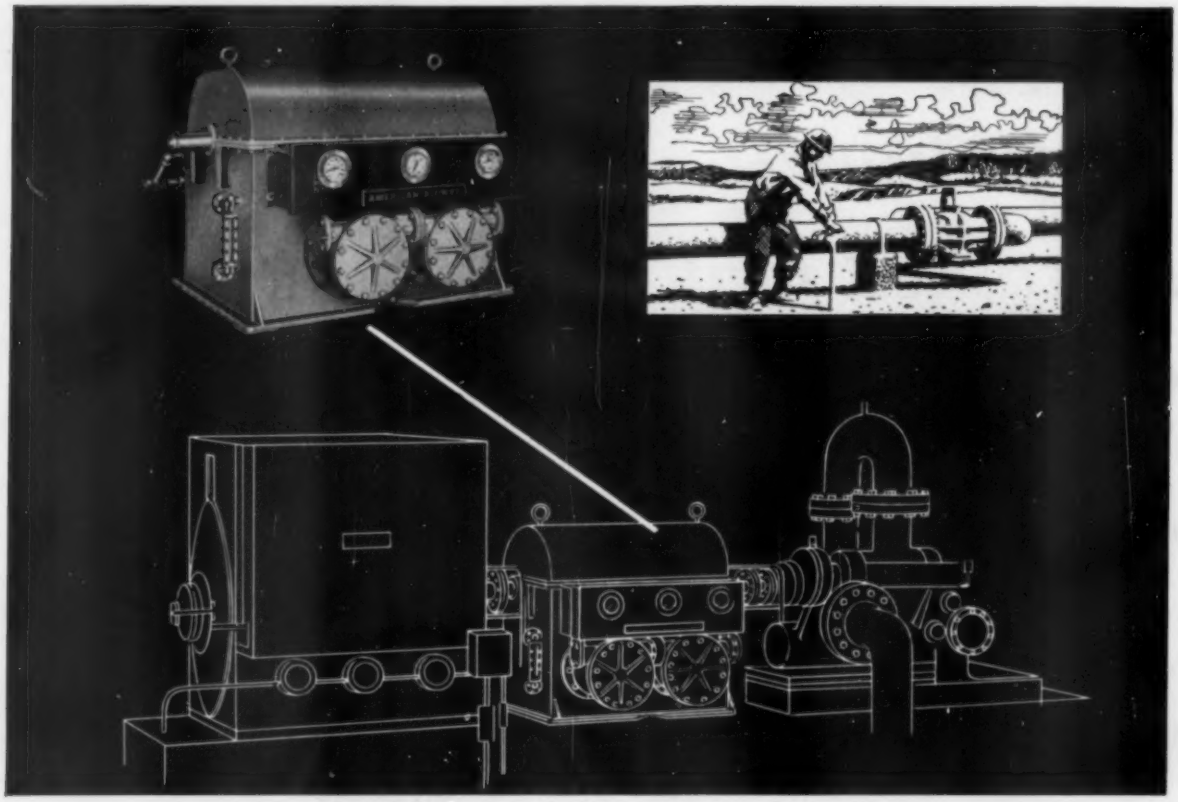
Eliminates stuffing box, torque tube, and bearings. Flexure-pivoted, bellows-sealed drive bar transmits diaphragm's linear motion to the pen arm with unequalled sensitivity *and undiminished* power. Seal for flexure pivot is a tough, flexible bellows.



Exclusive Range Springs

Heavy gauge Ni-Span C alloy, twin-spiral springs provide high sensitivity with lasting accuracy. Readily accessible . . . range changes are easily made, in minutes!

AMERICAN BLOWER *Gyrol*® FLUID DRIVE...



Class 6 Type VS Gyro. Fluid Drive, 250 hp to 12,000 hp, speeds to 3,600 rpm.

How to get more through-put per kw consumed at pipeline pumping stations

You save power dollars in pipeline pumping stations with American Blower Gyrol Fluid Drives. Used with standard, single-speed induction motors, the stepless, adjustable-speed Gyrol units control pump flow and pressure to give the desired output at the lowest power consumption.

For many years, the dependable Gyrol Fluid Drive has satisfied the automation requirements of the power plant industry for driving centrifugal boiler-feed pumps and fans. Now, the same reliable Gyrol Fluid Drive is providing the ideal means of remote-controlled power transmission for the centrifugal pumps in unattended pipeline pumping stations.

Whether you're pumping a single product or multiple products of various densities, here's how you benefit with the Gyrol Fluid Drive:

- Lower demand charges
- Power savings by adjustable pump speed
- No-load motor starting
- Wide range of pump control, permitting complete flexibility whether one or several products are being pumped
- The use of standard induction motors and Gyrol Fluid Drive to provide a safe, dependable power combination

Call your American Blower branch office for full information; or write: American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of American-Standard

Vertol 44 flies 19 passengers or 2 tons of cargo to offshore rigs

Carry 19 hefty passengers (200 pounds each) in roomy comfort 46 miles out and 46 miles back—or 12 passengers 187 miles out and 187 miles back—in your Vertol 44, and you'll still have fuel reserve for 20 minutes of cruising flight.

Watertight fuselage construction and new lightweight flotation gear assure you of the highest standards of safety.

Vertol's tandem rotor design provides a cabin 50% larger than any other commercial helicopter. This means more passengers or more cargo on every flight. Because of the fore and aft lifting forces, you have no load placement problems with the Vertol 44. Thus you can do away with ballasting and time lost in precise center of gravity computations.

When land or sea transport is a problem, move your pipe, pumps, compressors, motors and rig segments by Vertol 44. As a flying crane it holds bulky or odd-shaped cargo suspended beneath the fuselage in safety at good cruising speed.

The Vertol 44 Work Horse may be the useful and economical tool you need in offshore or exploratory operations. Details available on request to:

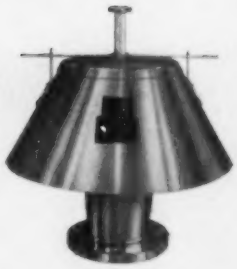
Customer Relations Manager
Vertol Aircraft Corporation
Morton, Pennsylvania

Tandem rotor design enhances safe operation from small platforms even under crosswind conditions and in gusts. Note whitecaps whipped up by 30-knot wind.

VERTOL Aircraft Corporation

MORTON, PENNSYLVANIA

new **S&J** *Breather Valves*



Materially Reduce Storage Tank Vapor Loss

New Shand and Jurs model ST-9749 diaphragm-type breather valves are a major achievement in storage tank venting and vapor conservation. They provide resistance to sticking, corrosion and freezing never before offered. In addition they require practically no maintenance feature non-wetting teflon-on-fiberglas diaphragms for maximum performance and longer life; completely eliminate critical drain holes or other areas that require continuous checking. Ruggedly built from aluminum and stainless steel, ST-9749 breather valves are lightweight, and already available in 4", 6", 8", and 10" sizes. Call your nearest S&J branch office or sales representative for Technical Bulletin 52D-ST-9749 Breather Valve.

SHAND AND JURS

GENERAL PRECISION EQUIPMENT CORPORATION GPE

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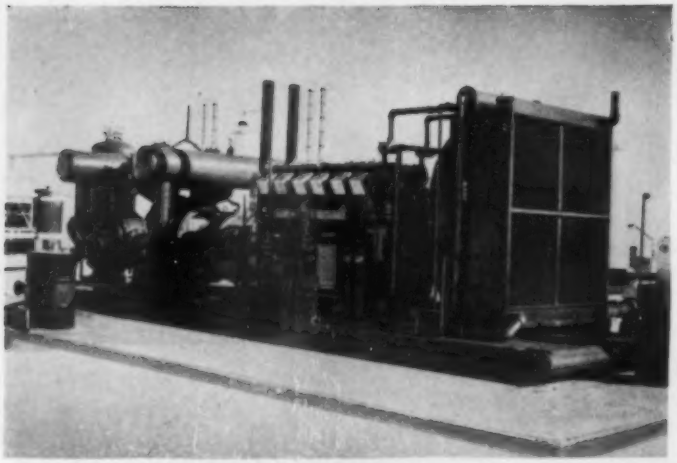


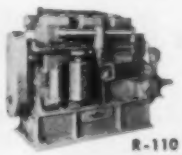
FOR POWERING COMPRESSORS

BIGGEST VALUE

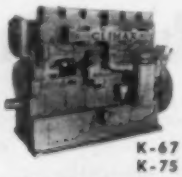
IN THE ENGINE INDUSTRY

HORSEPOWER RATINGS(1)											
Model	No. of Cyls.	Bore and Stroke	Cu. In. Displ.	WITH Radiator and Fan				WITHOUT Radiator and Fan			
			(2)	800	900	1000	1030	800	900	1000	1030
R-110	4	6½x7	824	58	64	69	71	61	68	75	77
R-165	6	6½x7	1238	85	95	103	105	90	101	110	113
K-67	6	7x7	1616	118	131	143	146	122	137	150	154
K-75	6	7½x7	1855	135	151	166	169	139	156	172	176
V-80	8	7x7	2155	153	171	187	190	157	177	195	200
V-85	8	7½x7	2474	181	200	216	221	186	206	224	230
V-122	12	7x7	3232	238	265	288	293	244	272	298	304
V-125	12	7½x7	3711	276	312	340	346	284	319	350	357

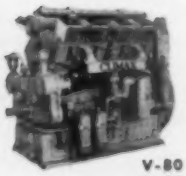
(1) These are continuous duty (API) ratings.
(2) R.P.M.



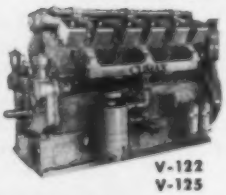
R-110
R-165



K-67
K-75



V-80
V-85



V-122
V-125

Here's Why

1. All models have a 7" stroke.
2. All main and connecting rod bearings are the precision type.
3. All intake and exhaust valves are the free-to-rotate type.
4. All cylinder blocks are provided with renewable sleeves (except R series).
5. All cylinder blocks are cast separate from the crankcase.
6. All pistons are aluminum, cam ground and have five (5) rings.
7. All crankshafts have a main bearing on each side of each crankthrow (except R series).
8. All connecting rods are rifle-drilled for pressure lubrication of piston pins (except R series).
9. All cylinder heads have Climax high turbulence type combustion chambers which produce maximum fuel economy.
10. All crankcases and engine bases have large hand holes on each side for easy access to main and connecting rod bearings and the oil pump.
11. All models have the Climax consistent design that makes possible maximum interchangeability of wearing parts.

These important features mean less down time, easier and faster field servicing and lower maintenance costs.

•

Ask your nearby Climax Distributor for full details today!

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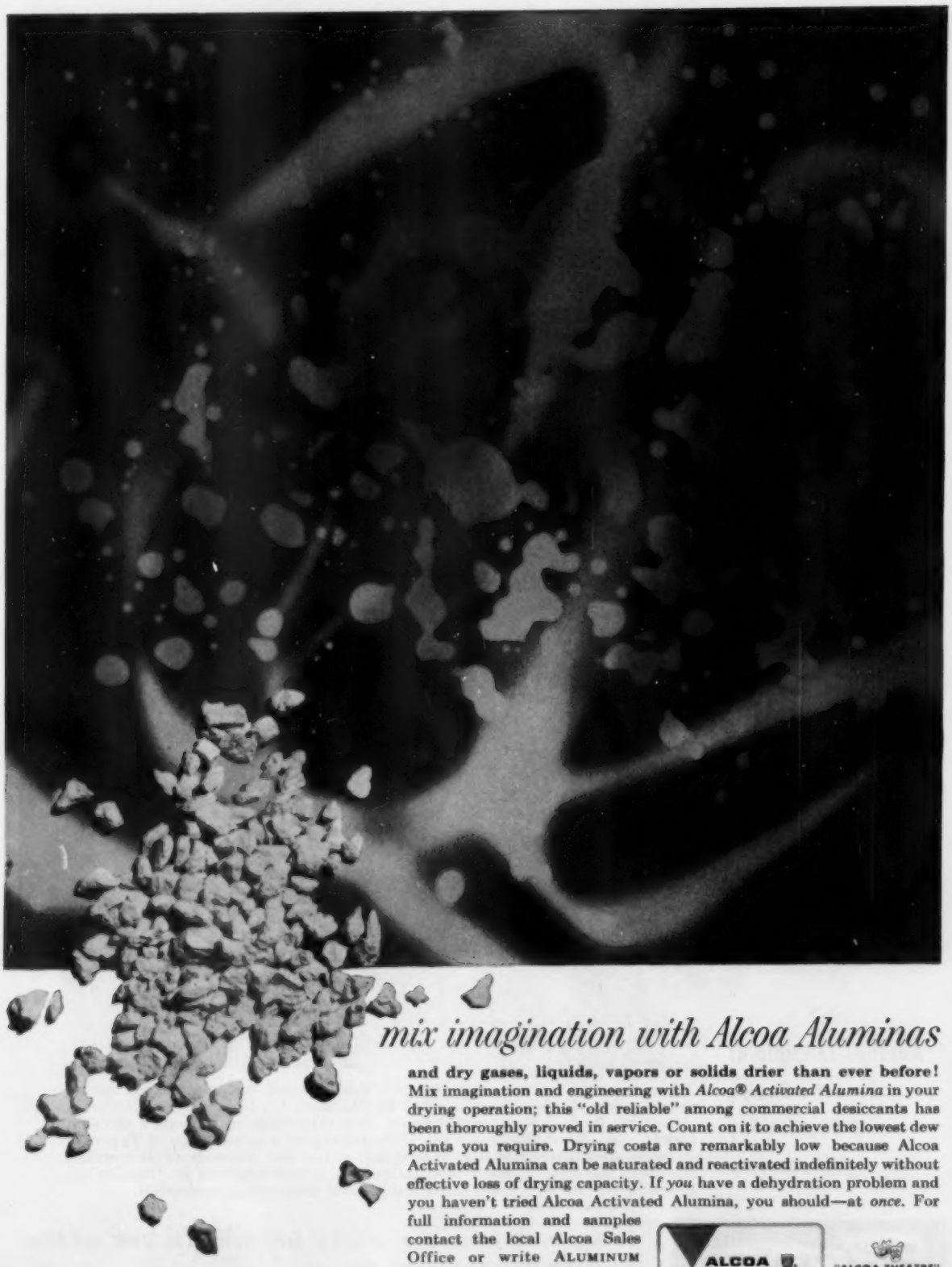

mix imagination with Alcoa Aluminas

and dry gases, liquids, vapors or solids drier than ever before! Mix imagination and engineering with *Alcoa® Activated Alumina* in your drying operation; this "old reliable" among commercial desiccants has been thoroughly proved in service. Count on it to achieve the lowest dew points you require. Drying costs are remarkably low because Alcoa Activated Alumina can be saturated and reactivated indefinitely without effective loss of drying capacity. If *you* have a dehydration problem and you haven't tried Alcoa Activated Alumina, you should—at *once*. For full information and samples contact the local Alcoa Sales Office or write ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 715-A Alcoa Building, Pittsburgh 19, Pa.

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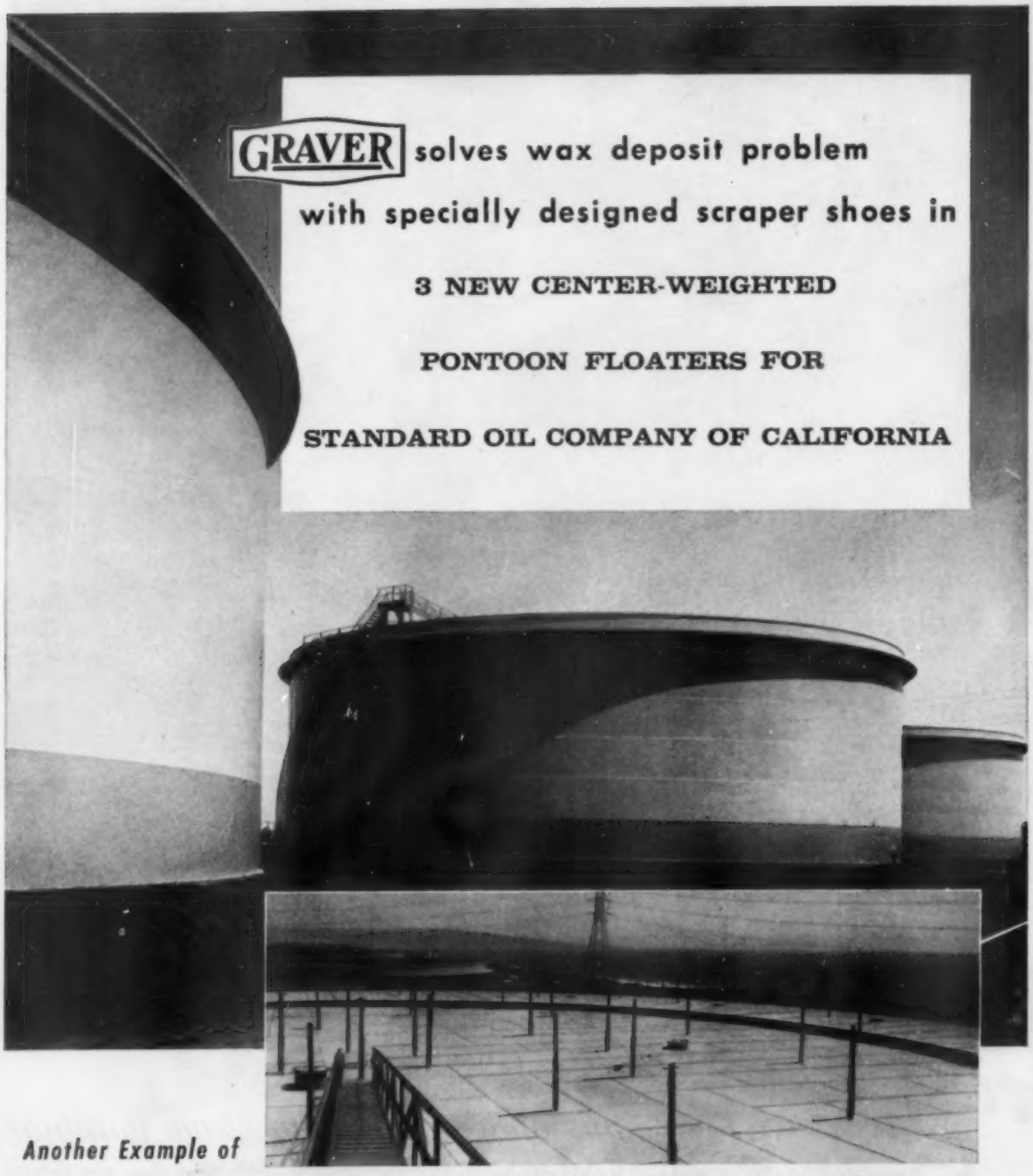

GRAVER solves wax deposit problem with specially designed scraper shoes in

3 NEW CENTER-WEIGHTED PONTOON FLOATERS FOR STANDARD OIL COMPANY OF CALIFORNIA

Another Example of Graver's Design and Engineering Leadership

These three new Graver 160,000 bbl. floating roof tanks, with the center weight *under the deck*, were selected by Standard Oil Company of California as suitable for high wax content crude. This type crude may create a problem of wax build-up on the tank shell. Graver designed a special shoe of Type 304 stainless steel to provide a scraper action as the roof descends. This stainless shoe and the unique, lower-cost under-deck center-weighted roof design are examples of Graver's imaginative design and engineering leadership.

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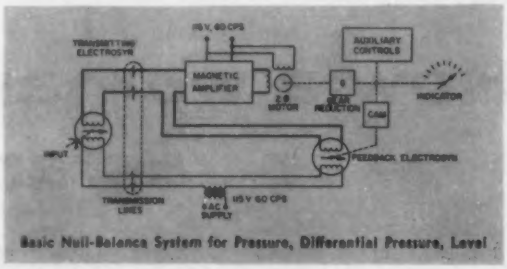
why?

More and more leading pipeline companies are choosing

NORWOOD CONTROLS ELECTROSYN SYSTEMS

to measure and indicate operation pressures and flows, and for digital telemetering...



Basic system consists of signal transmitter, magnetic servo amplifier, null-balance indicator. (No electron tubes, slide wires or continuously moving parts.)

In measuring pressure, the Model 501 transmitter utilizes a twisted bourdon tube as the pressure sensing element. This tube converts the pressure into shaft rotation of the ElectroSyn signal generator, a rotary differential transformer. The 8½-volt signal output from the ElectroSyn signal generator is an a-c voltage exactly proportional to the measured variable. Write for ElectroSyn Brochure B257 — **Norwood Controls Unit, Detroit Controls Division, 942 Washington St., Norwood, Mass.**

Basic Null-Balance System for Pressure, Differential Pressure, Level

because ElectroSyn offers:

- Higher reliability
- Lower maintenance
- Flexibility of application
- Rugged electro-magnetic system
- Can withstand static overload of 300% of rated pressure for a 1% zero shift
- Remote transmission
- Explosion-proof transmitters

AMERICAN-Standard
DETROIT CONTROLS DIVISION

Stopping the winch during the loading of a draw works shows the kind of strain a Mack B-80 is built to take day in and day out. Mrs. Gibson, shown above, is president and active manager of Hoot Gibson Trucking Company, an oil-field hauler in Oklahoma City.

How a woman succeeds as an oil-field trucker!

"I depend upon Macks," says Mrs. Gibson when asked to account for her success as an oil-field trucker. "My husband, who founded this business, put his faith in getting the best to do the most economical job. Since his death, I have carried on in the same manner.

"This is challenging, heavy-duty hauling, often under really adverse conditions. Hub-deep mud, roadless terrain, or over-the-road . . . we have found that Macks do the best job . . . working at top operating economy with a minimum of down time. Our performance and maintenance records prove the superiority of Macks."

Hoot Gibson's records prove it . . . and your records will, too, when you use Macks. Why not see your Mack representative for all the facts on the most complete line of heavy-duty trucks available today. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

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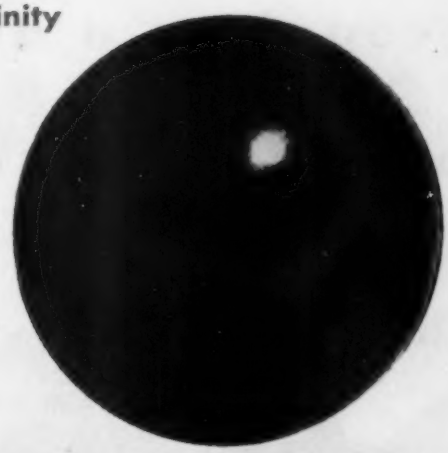

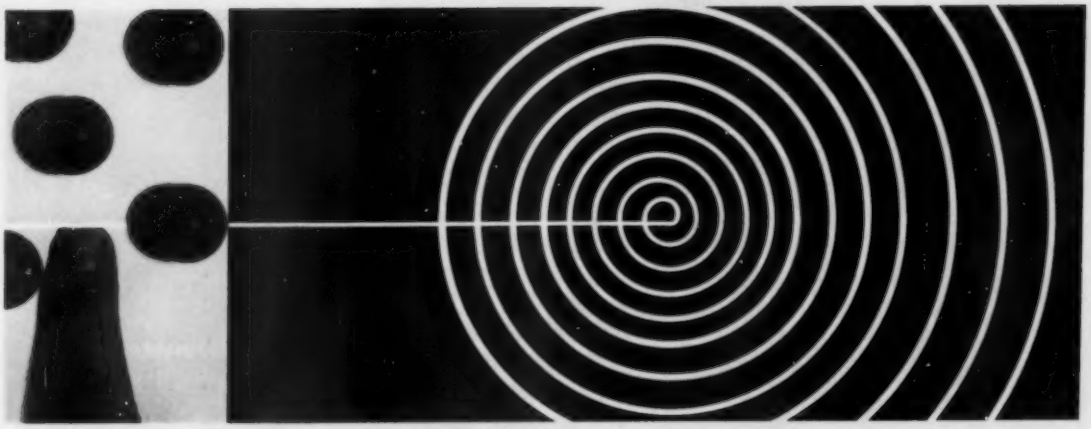

perforation ball sealers

Continuous engineering development of all Western products and services provides the oil industry with greater effectiveness in well completion and remedial work.

Western services are engineered from the lab to the well—in a never-ending program designed to insure the most advanced well services available.

Perforation Ball Sealer Process, introduced by Western in 1956—and now an industry standard—is a part of the continuous development program. Field performance data and laboratory experiments have led to the superiority of today's Western Ball Sealer treatments.

But development does not end here. New treating techniques, new materials and tools are constantly being sought—and your future wells will benefit from this infinite engineering endeavor.

Perforation Ball Sealer Process is just a single example of Western engineering for improved well servicing—and you will find the same engineering advantages in all Western services.

Gammatron Logging
Perforating
Fracturing
Acidizing
Selective Water-Seal Service

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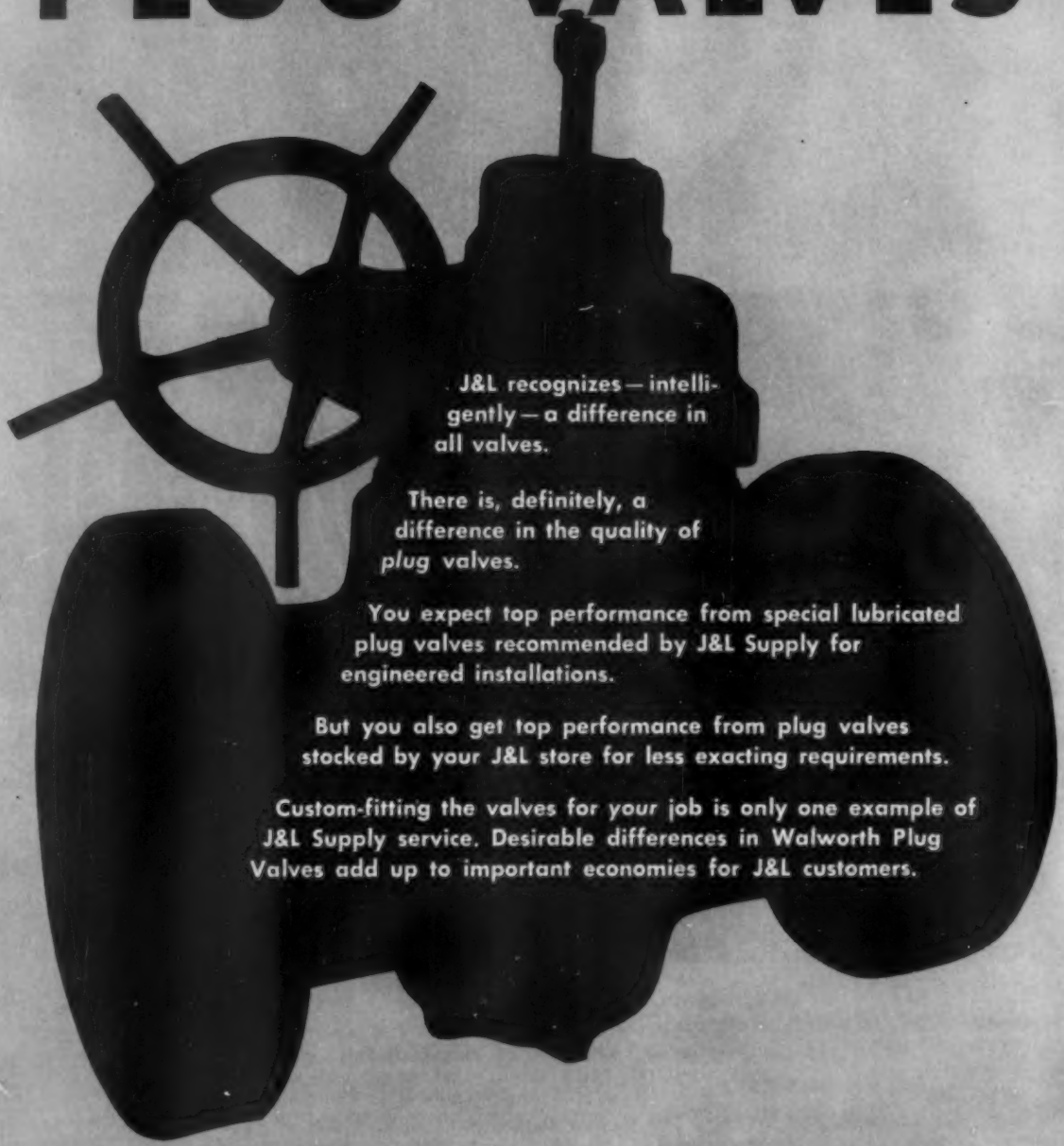
J & L recognizes a difference in PLUG VALVES



J&L recognizes—intelligently—a difference in all valves.

There is, definitely, a difference in the quality of *plug* valves.

You expect top performance from special lubricated plug valves recommended by J&L Supply for engineered installations.

But you also get top performance from plug valves stocked by your J&L store for less exacting requirements.

Custom-fitting the valves for *your* job is only one example of J&L Supply service. Desirable differences in Walworth Plug Valves add up to important economies for J&L customers.

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J&L — A GREAT NAME IN SUPPLIES

26

what's it worth to have a full 200° operating arc?

DAVIS BACKHOE lets you cover more area from ONE POSITION!

A Davis Loader and Backhoe combination will put money in your pocket by outperforming any other rig — pound for pound, dollar for dollar.

EXCLUSIVE FLUSH-DIGGING — Entire mast and boom assembly shifts from center to either side for flush digging alongside buildings, fences, hedges, and other obstructions. Only Davis has this advanced feature.

Versatility, convenience, and speed... These are your advantages when you own a Davis Backhoe with continuous 200° arc. Here's how these advantages let you profit more on every job:

VERSATILITY — Side mounted, you can dig flush alongside walls, etc.... or have greater reach in right-angle digging — operates in places that are inaccessible to other rigs. You can dump close to the hole... dump wide... or direct-load into a truck!

CONVENIENCE — Davis rigs are entirely hydraulic. Individually controlled non-slip stabilizer feet let you level-up and hold on slopes... tilt for bell holes. Large, well-padded seat may be adjusted for tall or short men. Both seat and controls swing with the boom, so you always face your work.

SPEED — Davis works fast! The 10,000 pounds of breakaway created by its rams gives you all the power you need to dig in frozen ground or asphalt. A wide variety of quick-change buckets expedites production by letting you select the most efficient tool for any kind of project. Davis' design gives you an unobstructed view of the entire work area. You don't have to depend upon shouts and hand signals for guidance. Detaches in five minutes if you want to use just the tractor and loader for other jobs. ***Priced Competitively Low!***

Davis Loaders and Backhoes are available for all popular models of International, Ford, Fordson Major, Ferguson, Case, Massey-Harris, Allis-Chalmers, Oliver, John Deere, Minneapolis-Moline, and Work Bull Tractors.

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For the name of your nearest dealers call Western Union by number and ask for Operator 25... or write direct. Please specify make of tractor.

MASSEY-FERGUSON INDUSTRIAL DIVISION
MASSEY-HARRIS-FERGUSON, INC.
1009 S. WEST STREET • WICHITA 15, KANSAS

Fig. 3466 Horizontal Triplex Plunger Pump. Maximum speed, 250 RPM. Maximum capacities and pressures: 91 barrels per hour at 1180 PSI; 179 barrels per hour at 600 PSI. Write for 1958 catalog.

THAT'S WHY WE'VE ADOPTED THEM AS STANDARD

We experimented a long time—and found, when the returns were in, that we got more of what we want in Gaso Pumps. More in adaptability to various conditions. More in day-in and day-out dependable performance. More in operating and maintenance economy, and more in service life. That, in a nutshell, is why we wrote GASO into our standard pump specifications, and why we consider the policy a short cut to the results we want in pumping service.

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7. First to be U.L. approved for banked circuit breaker grouping

This superbly engineered equipment offers positive lasting protection against explosive vapor, dust, or rain! Regardless of the installation, where absolute safety is required... APPLETON ...your single source for industry's most complete line of explosion-proof equipment... can serve you better!

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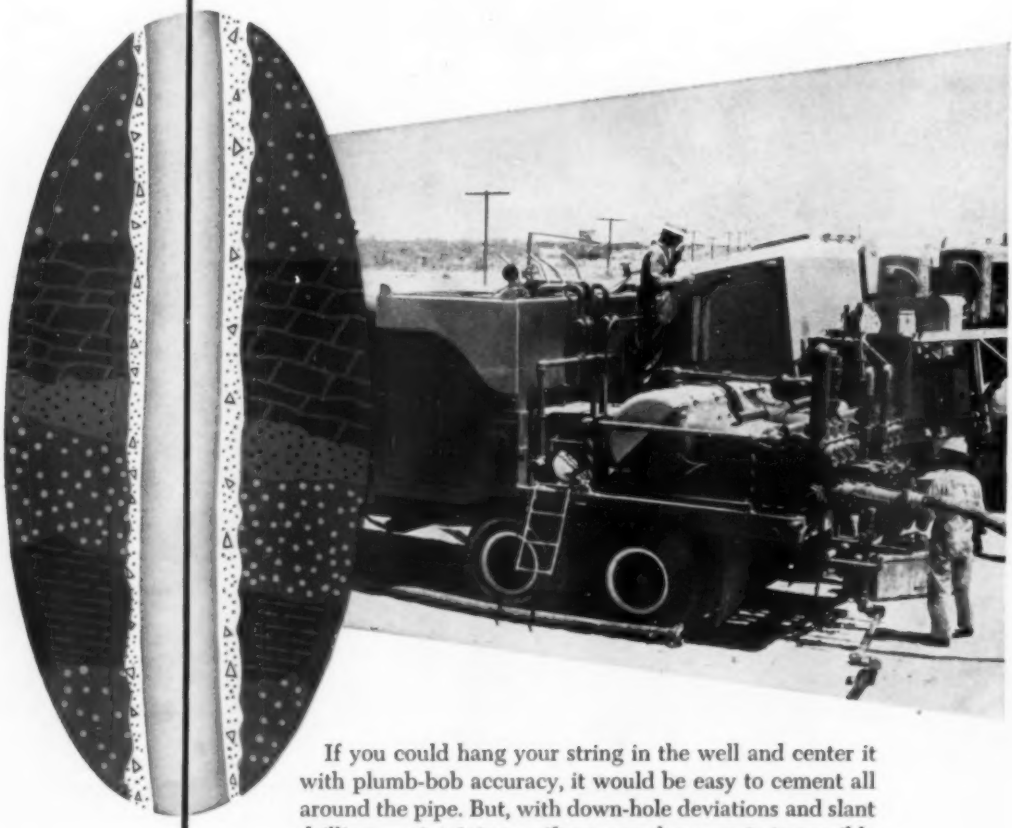
Outlet Boxes

Rely on APPLETON... the Standard for Better Wiring®

APPLETON ELECTRIC COMPANY • 1718 Wellington Avenue • Chicago 13, Illinois

CENTER before you cement



If you could hang your string in the well and center it with plumb-bob accuracy, it would be easy to cement all around the pipe. But, with down-hole deviations and slant drilling, maintaining uniform annulus area is impossible without mechanical assistance. With Halliburton's Centralizers you get the positive centering that permits placing cement entirely around the pipe for uniform strength and protection.

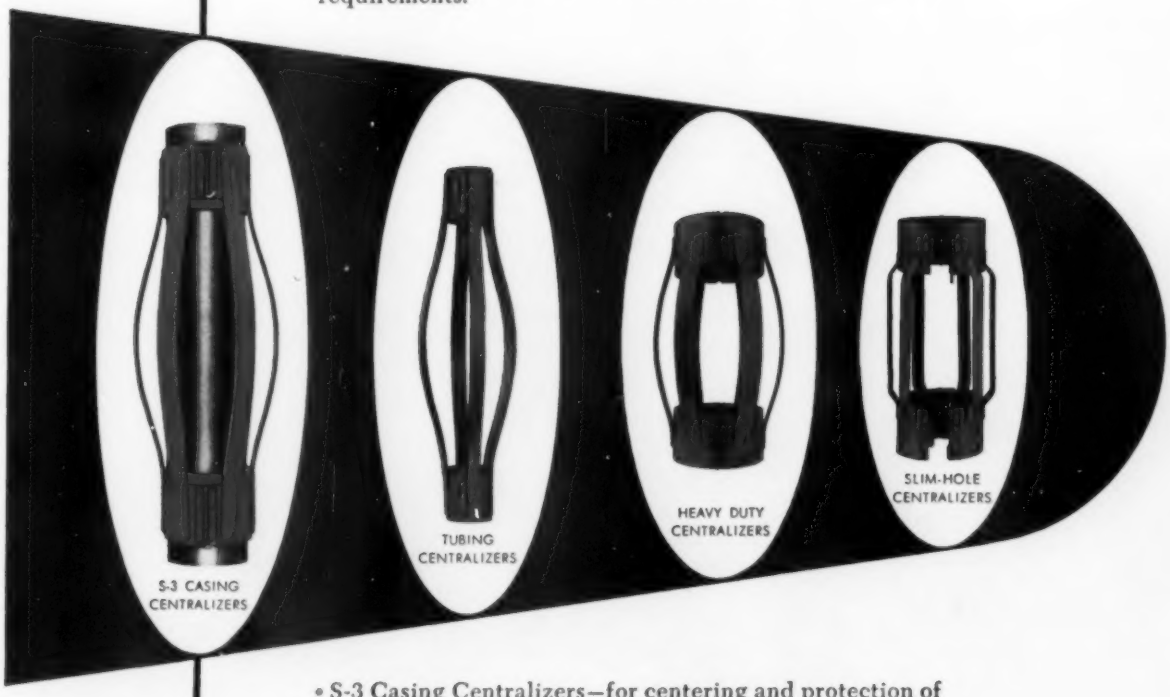
You increase the life of your pipe...and thereby lengthen the life of your well when you specify Halliburton Cementing Service using Halliburton Centralizers for casing, liners and tubing. Centralizers keep saving their cost long after their low price is forgotten. Call your local office or write the Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

OIL WELL CEMENTING COMPANY DUNCAN, OKLAHOMA

A CENTRALIZER FOR EVERY JOB

For positive centering of casing, liners, tubing or drill pipe, you need Centralizers designed specifically for each of these particular applications. Just one kind or type won't serve all jobs. That's why Halliburton provides four different types, each designed to give you better centering under specific requirements.



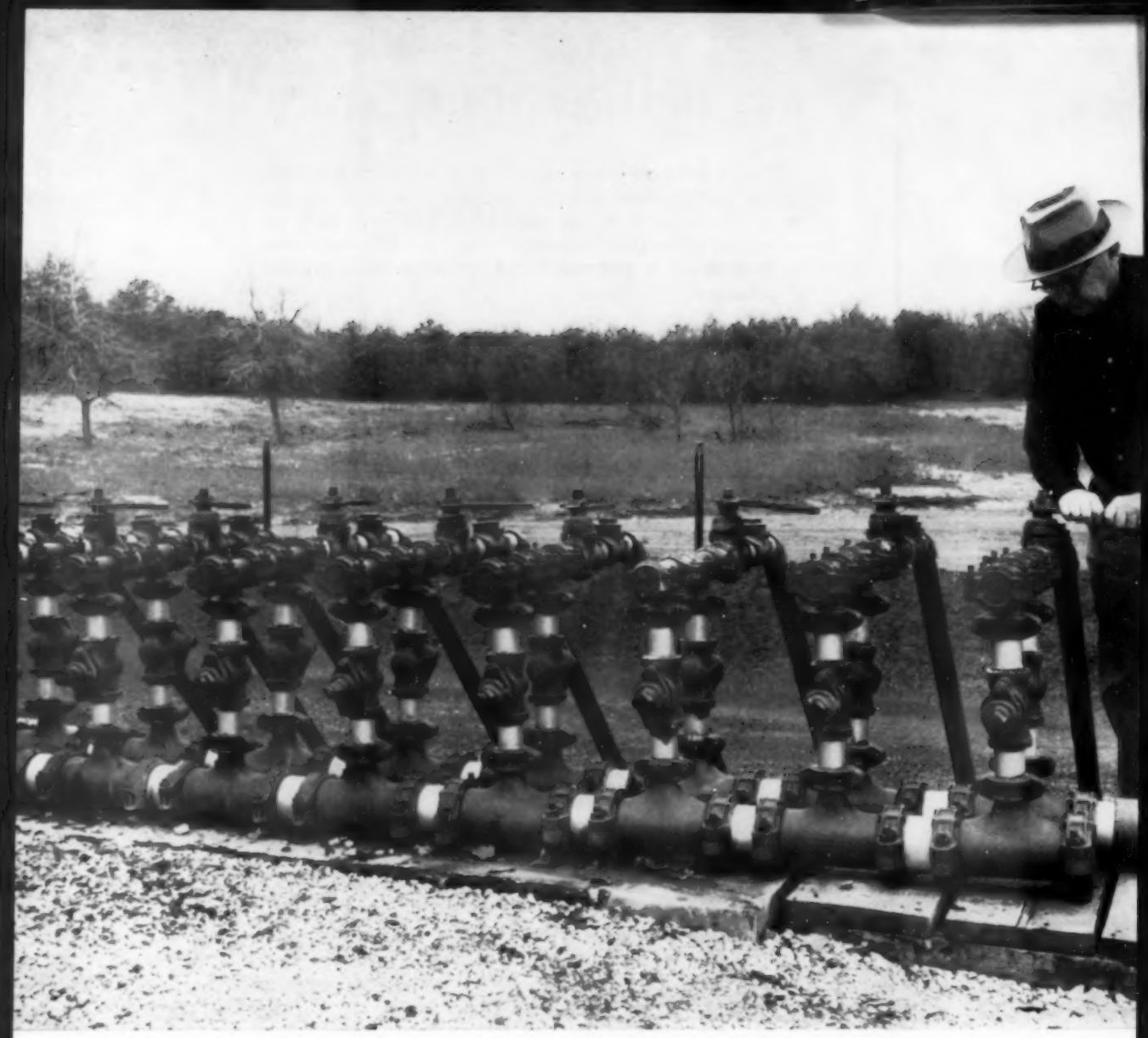
- S-3 Casing Centralizers—for centering and protection of casing under most conditions.
- Tubing Centralizers—for centering tubing to provide better placement of cement around the string.
- Heavy Duty Centralizers—for unusually high centering force under severe conditions.
- Slim-Hole Centralizers—for specific slim hole sizes and liners run in casing.

Because Halliburton Centralizers are specifically designed for each particular application, positive centering is made possible with fewer centralizers. This means you get dependable performance with economy... better results for less money.

The Halliburton Bulletin, "Centralizers For Any Conditions" contains valuable information on how to get positive centering, with charts to help you determine maximum spacing under various conditions such as hole and pipe size and hole deviation. Your free copy is available for the asking.

CEMENTING SERVICES

284 SERVICE CENTERS—JUST MINUTES AWAY FROM YOUR RIG



How To
PREVENT HEADER HEADACHES

Leaking, cantankerous production header valves are always costly in terms of lost manpower and repair bills. That's why so many lease operators rely on lubricated plug valves to insure easy operation and rugged dependability . . . *at lowest cost per year.*

For over forty years, Rockwell-Nordstrom lubricated plug valves have been preferred and specified by oil field men all over the world. They have learned that *pressurized lubricant sealing* means positive shut-off on any service. And the lubricant-smooth, quarter-turn operation can't be matched for fast, instant closure.

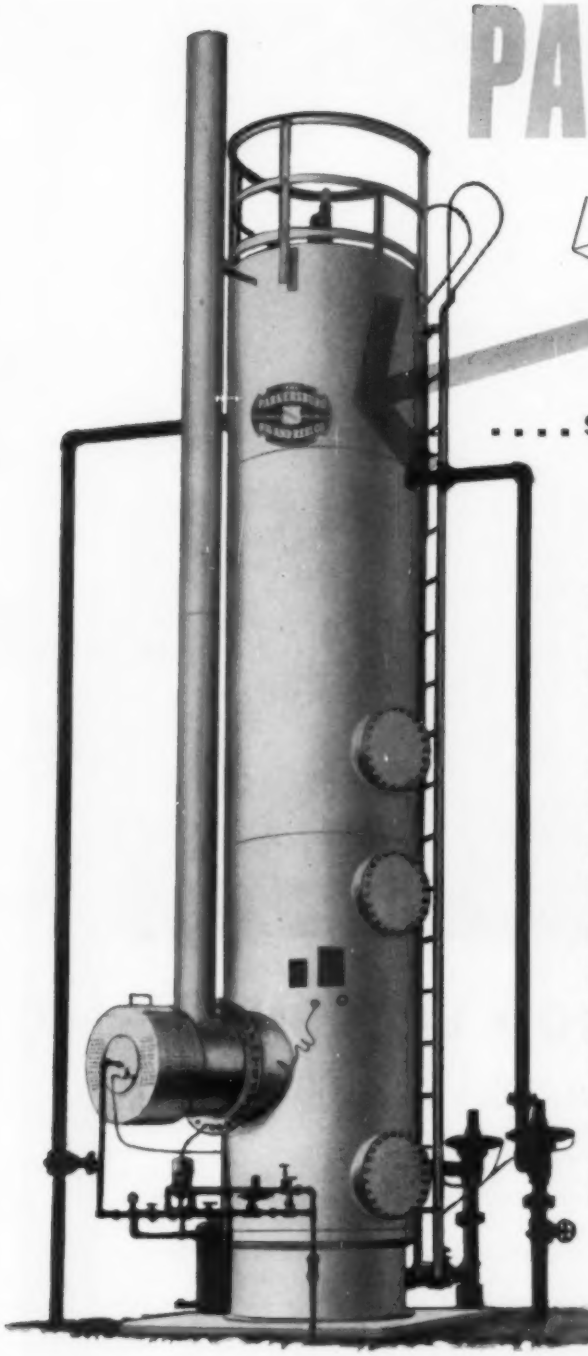
Rockwell-Nordstrom valves are available in a complete range of sizes and pressures for every oil field service. For complete details, see your supplier or write to Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania.
Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom VALVES

it's ROCKWELL

MANUFACTURING COMPANY

PARKERSBURG



....SIGN OF TOP QUALITY
in emulsion treaters

One name is always outstanding. In emulsion treaters, that name is PARKERSBURG. For economical, efficient operations, you can depend on a Parkersburg Emulsion Treater. Complete free water knockout inside treater shell reduces fuel required. Large cleanout manways and longer heating tube life reduce maintenance time. And there is a Parkersburg Emulsion Treater to fit any requirement.

SERIES ETSI treaters have built-in heat exchanger and partition for maximum pre-heating. Internal piping reduces danger of freezing or sluggish operations in cold weather.

SERIES ETS treaters are inexpensive, economical treaters designed for the average loose, non-foaming emulsions which do not require long retention time or pre-heating.

SERIES ETSW is completely winterized for cold climate operation without danger of discharge water freezing. With the inlet and discharge piping inside and rising to the top of the treater, radiation loss is substantially reduced.

SERIES GB treaters meet the need for a treater to handle the looser types of emulsions. This series features efficient, low volume separation of gas from flow stream. Heater and wash tank are in one unit.

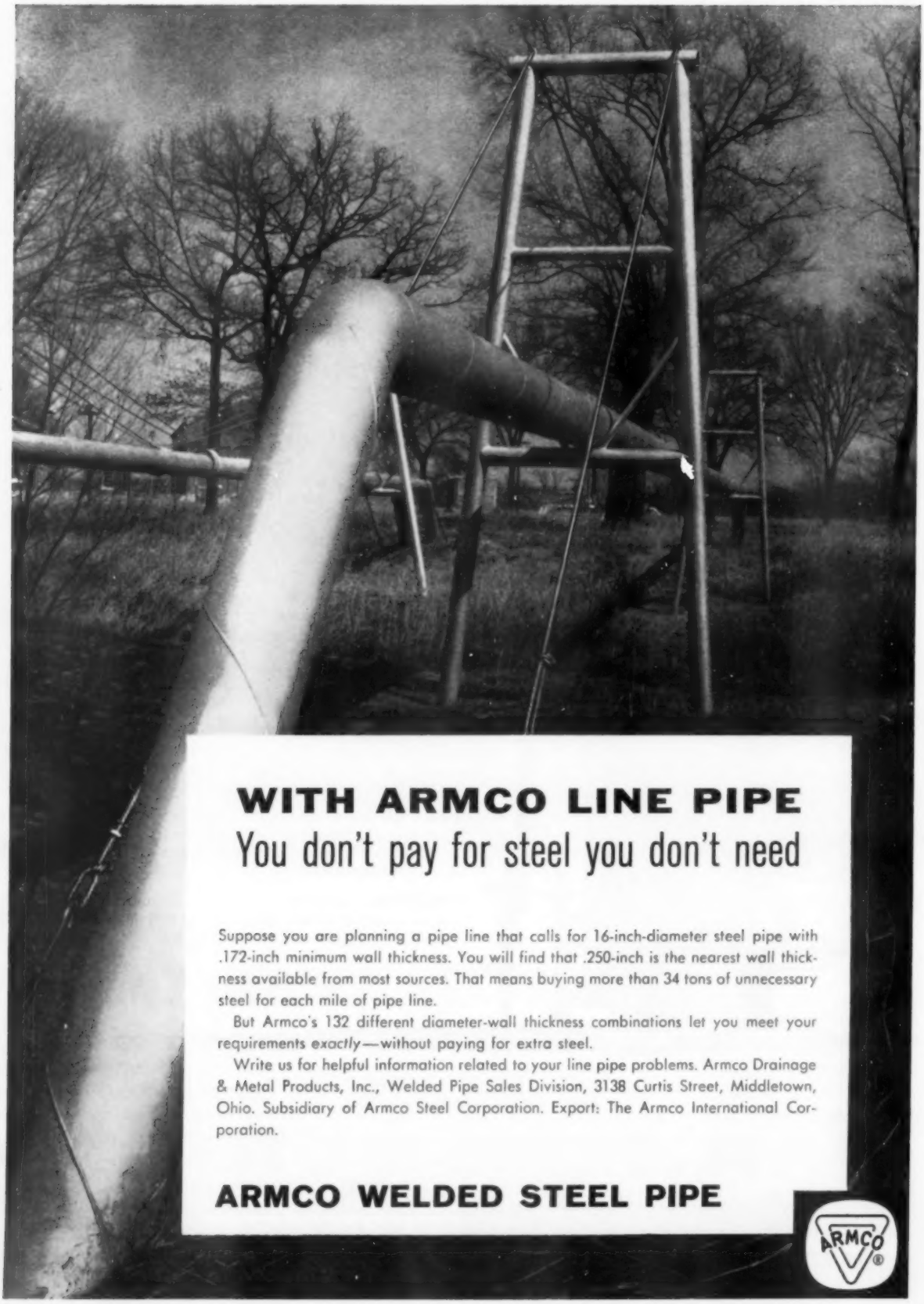
HORIZONTAL emulsion treater has 25% more settling space than in a vertical treater of equal size and has 40% more treating capacity. Horizontal treaters are less costly to install, too.

For an emulsion treater that is outstanding in quality and economy, specify Parkersburg!

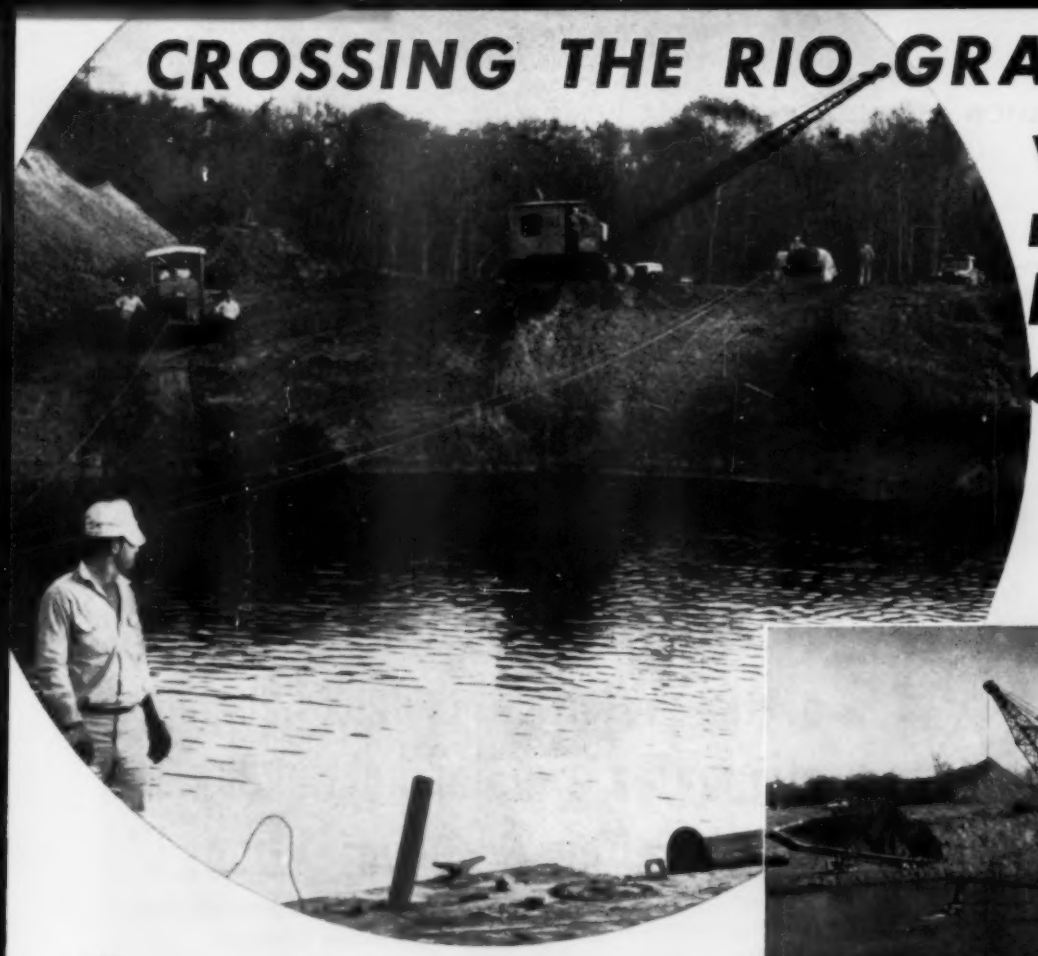
THE
PARKERSBURG
RIG & REEL COMPANY
DIVISION OF PARKERSBURG • AETNA CORPORATION

PRODUCTION EQUIPMENT DIVISION OFFICES: P.O. Box 13295 Houston 19, Texas

THE PARKERSBURG RIG AND REEL CO. PARKERSBURG WEST VIRGINIA


WITH ARMCO LINE PIPE
You don't pay for steel you don't need
Suppose you are planning a pipe line that calls for 16-inch-diameter steel pipe with .172-inch minimum wall thickness. You will find that .250-inch is the nearest wall thickness available from most sources. That means buying more than 34 tons of unnecessary steel for each mile of pipe line.
But Armco's 132 different diameter-wall thickness combinations let you meet your requirements exactly—without paying for extra steel.
Write us for helpful information related to your line pipe problems. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 3138 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.
ARMCO WELDED STEEL PIPE
ARMCO

CROSSING THE RIO GRANDE with a record breaking cut!



TEXAS EASTERN TRANSMISSION CORP. 30-in. main line reaches into Mexico. Crossing the Rio Grande presented a problem. The Rio Grande has a habit of zig-zagging over an area of over a mile wide.

To solve the problem lines were put down 20 ft. below the bed of the river. The job called for handling 1,000,000 yds. of dirt on the 4,700-ft. crossing. Two Northwests handled the water crossing—a Model 25 worked on one side and and a veteran Model 95 worked on the other.

This is just one of the many pipe line jobs that Northwest equipment is on.

Northwest versatility—its ability to go places and do things a little more smoothly, a little faster, make it a cost cutter and time saver whether it's afloat on a barge or handling pipe in the desert. Steering with positive traction on both crawlers while turning as well as when going straight ahead takes it where other similar machines have difficulty.

A wide range of boom hoist equipment gives you the proper selection for any problem. Uniform Pressure Swing Clutches take the jerks and grabs out of swinging. There is no jockeying the load to spot it. The "Feather-Touch" Clutch Control gives ease of operation along with the *feel of the load.* There are no pumps, compressors or other complications to call for special knowledge for adjustments.

There are many advantages that you should know about. Ask a Northwest Man to tell you the whole story.

NORTHWEST ENGINEERING COMPANY

1513 Field Bldg., 135 South LaSalle St., Chicago 3, Illinois

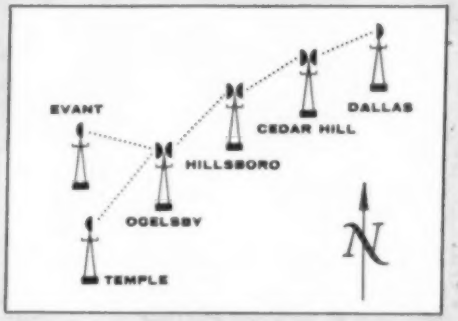
NORTHWEST Always Ready to GO

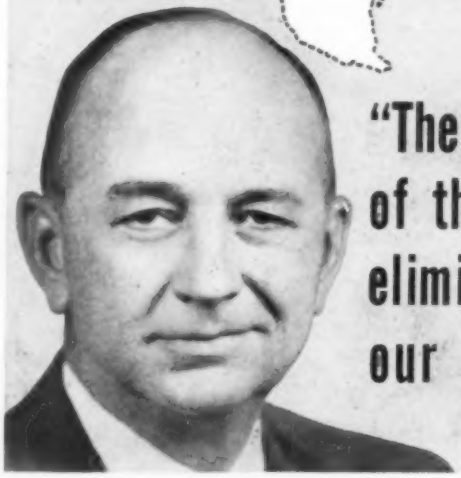
NORTHWEST EQUIPMENT IS BUILT IN THE FOLLOWING SIZES

SHOVELS	CRANES	DRAGLINES	PULLSHOVELS	TRUCK CRANES
¾ Yd. to 2½ Yd. Capacity	13-Ton to 50-Ton Capacity	¾ Yd. to 3 Yd. Capacity	¾ Yd. to 2½ Yd. Capacity	25-Ton and 35-Ton Capacity

G-42-LCG

MORE THAN A MILLION CHANNEL MILES OF RCA MICROWAVE SYSTEMS NOW IN SERVICE





"The new RCA Microwave System of the Atlantic Pipeline Company eliminates a major bottleneck in our pipeline communications!"

M. S. Collett, *Manager Communications*
Atlantic Refining Company

"It has allowed us to virtually double our communications system to a total of 8300 channel miles, through use of additional carrier channels or wireline facilities, which are tied into the microwave system, and has provided the cornerstone for future microwave expansion to include telemetering, facsimile, and VHF radio control."

Present route requires only six stations, but can be expanded, as needed, along the pipeline right-of-way either to West or East. The RCA CW-20A microwave system is 171 miles in length and interconnects with approx. 1900 miles of existing wireline. The microwave system connects Atlantic's Dallas office with pump stations at Temple and Evant, Texas. Initially it will provide 13 voice channels into Dallas, designed for expansion up to 46 channels. It will improve the over-all reliability of Atlantic's communications network by eliminating major outages due to weather and man-made damage.

The baseband amplifier in this RCA system provides a broad band from 300 cycles to 500,000 cycles on which multiplexed circuits are placed. Channels may be interchanged simply by switching plug-in crystals. Channel units have the high stability required for frequency-shift telegraphy, telemetering, and facsimile. Multiplex circuits employ standard single sideband, suppressed carrier technique long accepted for efficient utilization of spectrum space. For further particulars on use of microwave in utilities, pipelines, turnpike and other applications . . .

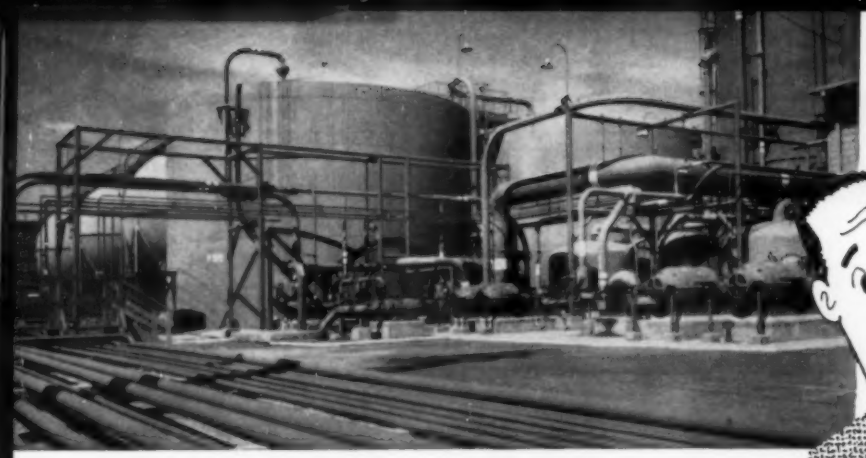
Get the help of RCA Specialists—write to
RCA Dept. BC-89, Building 15-1, Camden, N. J.

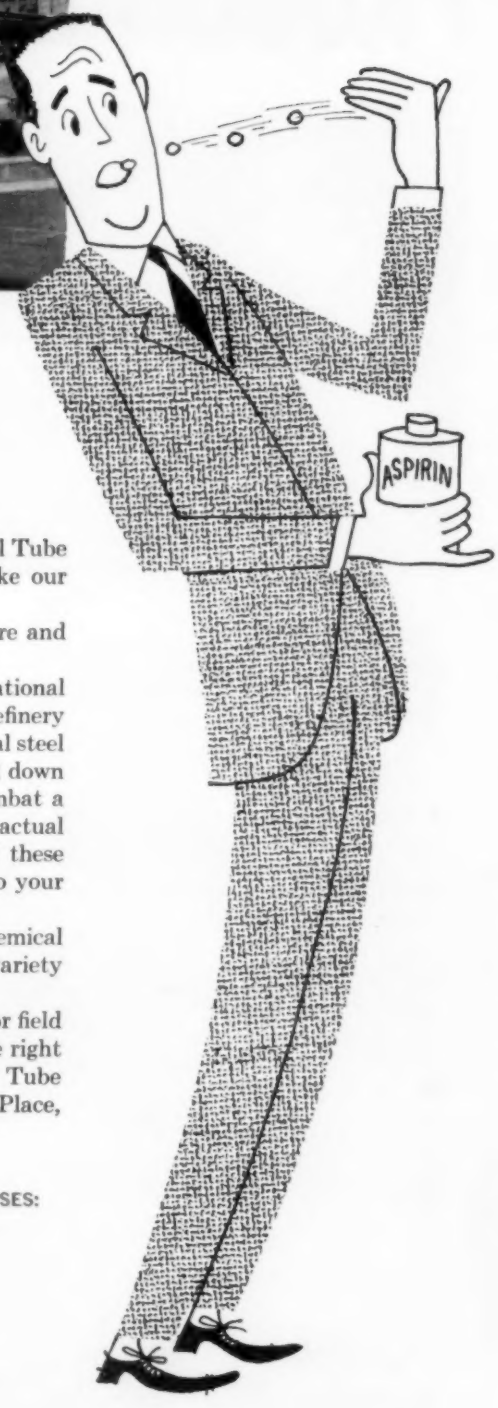
RADIO CORPORATION of AMERICA
COMMUNICATIONS PRODUCTS
CAMDEN, N. J.
In Canada: RCA VICTOR Company Limited, Montreal

Tmk(s) ®

Dispatchers controlling vast Atlantic pipeline network at Dallas, Texas.

Tank farm at Midland, Texas part of the extensive pipeline system.





You say you have a corrosion problem?

BEFORE IT DEVELOPS into real trouble, why not give National Tube a call. Refinery tubing problems are our specialty. We make our living by solving them.

Corrosion problems? Acid problems? Temperature, pressure and oxidation problems? We solve them all.

How do we do it? Here's how: we've kept case histories at National Tube for over 60 years—precise data on thousands of tough refinery tubing problems. Each of these problems was solved by a special steel alloy. This accumulation of alloy information has been boiled down to 24 different steel tube analyses, each one designed to combat a specific set of refinery conditions. Long, rigorous testing in actual refinery service has proved the capabilities of every one of these analyses. We feel confident that one of them is the answer to your problem.

In addition to the two dozen analyses shown here, other chemical compositions are available in tubular products, and a wide variety of temperature problems is presently under study.

So, get in touch with us. Our Mill Service Force, available for field consultation, will help you find just the alloy you need, at the right price, to meet your refinery conditions. Write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

HERE ARE NATIONAL TUBE'S TWO DOZEN DIFFERENT TUBE ANALYSES:

Carbon	5 Cr, ½ Mo	17 Cr
Carbon, ½ Mo	5 Cr, ½ Mo, 1½ Si	18-8
1 Cr, ½ Mo	7 Cr, ½ Mo	18-8 Ti
1¼ Cr, ½ Mo	8 Cr, ½ Mo	18-8 Cb
2 Cr, ½ Mo	8 Cr, 1 Mo	18-8 Mo
2¼ Cr, 1 Mo	9 Cr, 1 Mo	25-20
2½ Cr, ½ Mo, ¾ Si	12 Cr	3½ Ni
3 Cr, 1 Mo	12 Cr, Al	5 Ni

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

NATIONAL SEAMLESS PIPE AND TUBES

UNITED STATES STEEL

PROCON BUILDS REFINERY

we plan the refinery, every requirement, every detail is carefully anticipated. Process units that will perform as required are incorporated into an efficient design.

we train 85% of the native Cuban workmen in the technicalities of construction. These men were developed into highly skilled workers, other previously trained mechanics were up-graded and perfected in various construction trades.

we solve some tough problems. 1 and 2. Prefabricated crude atmospheric column was unloaded and floated ashore overcoming expensive and time-consuming transport problem. 3. Prefabricated panels go on Platformer and crude heaters. 4. Some of the foundations and piping trenches were blasted from solid rock.

FOR TEXACO IN CUBA

And here's how we did it . . . Solving challenging construction problems proves Procon's ingenuity.

It's a pretty exacting business at best, building a refinery from scratch. Add a double handful of natural, geographical and human problems to it and you've got a fairly clear picture of the challenges Procon met and overcame to give The Texas Company (West Indies) Limited this handsome refinery, the first ever built in eastern Cuba.

The pictures you see here tell some of the story of how this 20,000 BPSD refinery was built by Procon three miles south across the bay from Santiago.

If you have a refinery in mind . . . or a petrochemical plant, or a chemical plant or individual process units for any of these . . . you can be sure of top-flight construction anywhere in the world when you call on Procon to do the job.

The refinery is served by a deep-water dock that accommodates two tankers simultaneously. Procon laid a 24-inch crude line and auxiliary piping to pipe feed stock directly into processing area.

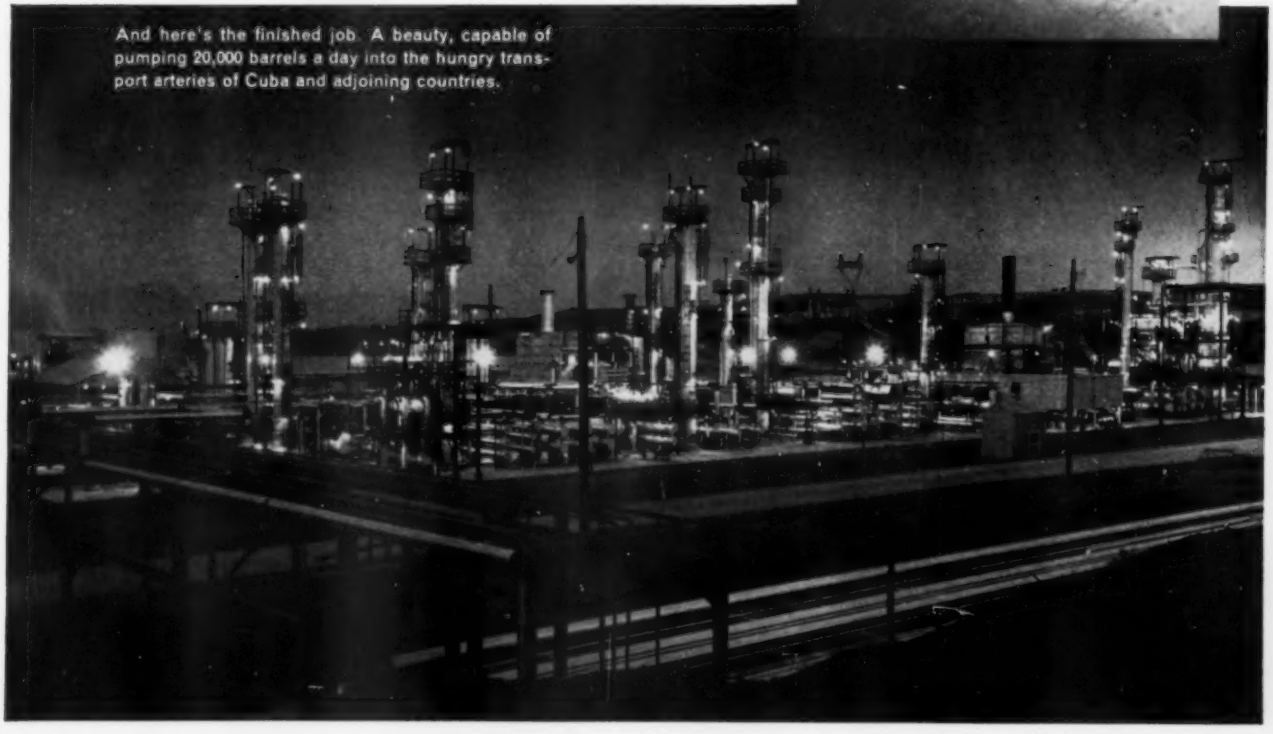
PROCON *International, S. A.*

JOSE A. SACO, NO. 6, SANTIAGO DE CUBA

PROCON INCORPORATED, DES PLAINES, ILLINOIS, U. S. A.
PROCON (CANADA) LIMITED, TORONTO 18, ONTARIO, CANADA
PROCON (GREAT BRITAIN) LIMITED, LONDON, W. C. 2, ENGLAND

WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

And here's the finished job. A beauty, capable of pumping 20,000 barrels a day into the hungry transport arteries of Cuba and adjoining countries.



GUIBERSON SWABS DO A

GOOD LOW COST JOB!

GUIBERSON'S Type J

Type L

Type GW

Here are three swabs capable of swabbing all sizes of tubing and drill pipe — in a minimum of time — making them most economical and efficient for routine swabbing. Many other types of Guiberson cups are immediately available for *specific* and *unusual* swabbing problems.

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by
Oil Field Supply Stores
Everywhere

No . . . These Are All BS&B Spherical Separators Efficiently Performing On A Gulf Oil Corp. Lease!

Although at first glance the above installation might appear to be a launching area for earth satellites, it is in reality a battery of 18 BS&B Model "OGS" Spherical Separators.

Located at Gulf Oil Corporation's Consolidated Tank Battery #4, Citronelle, Mobile County, Alabama, each of these units is 41 inches in diameter and has a nominal working pressure of 125 psi. Throughput of each separator is approximately 500 bbls. of 43 to 36 gravity oil daily.

Also available in shell diameters of from 24 to 54 inches and in working pressures ranging from 125 to 6,000 psi, these Model "OGS" units are of an exclusive BS&B design which takes full advantage of the spherical characteristics of the separator to give maximum separation efficiency.

FEATURES

1. **Simple Hookup**
   Connections to top inlet and bottom outlets are easily made from any direction.
2. **Liquid Slugs**
   Internal design diverts liquid slugs rapidly to liquid section.
3. **High Capacity**
   The large area of liquid surface area to volume in the liquid section allows rapid release of solution gas from the oil.
4. **Controls**
   All Controls and valves are BS&B.
5. **Compact Design**
   Small space requirement of the Model "OGS" is a distinct advantage over other separators.
6. **Servicing**
   Convenient access openings are provided to simplify periodic cleaning and blow-down.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

For Full Information On The BS&B Model "OGS" Spherical Separator, Contact Your BS&B Representative, Or Write To...

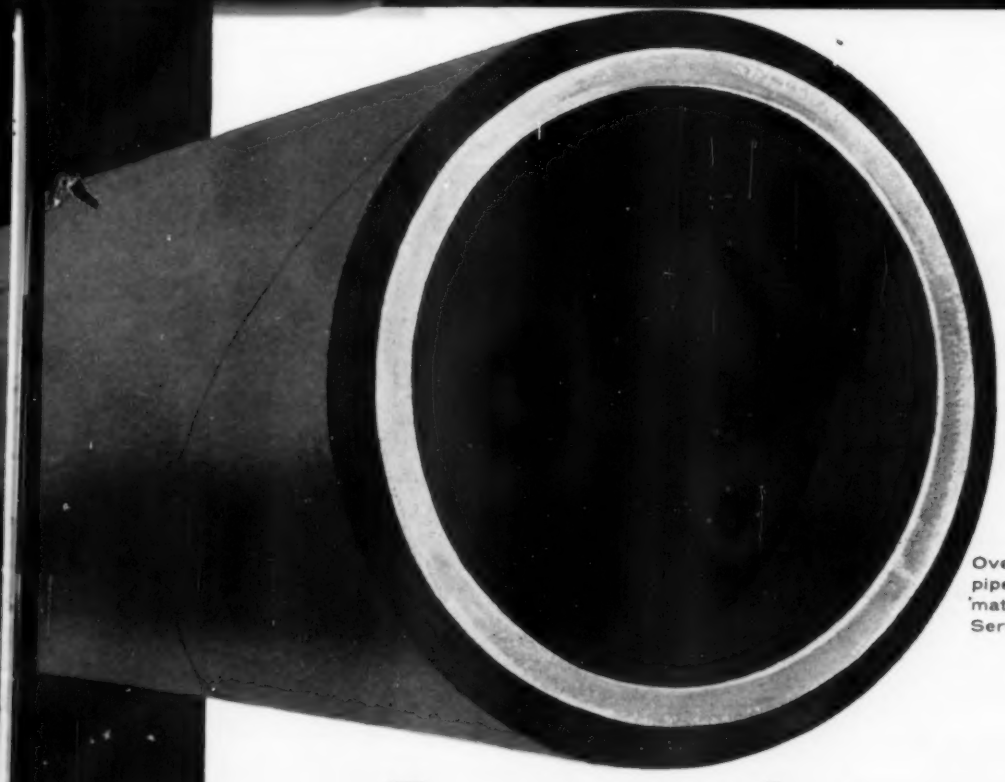
BLACK, SIVALLS & BRYSON, INC.

Oilfield Equipment Division, Dept. 1-A1A

P. O. Box 1714

Oklahoma City, Oklahoma

There's a PLS plant strategically located to serve YOU!



Over 100,000 miles of protected pipe in 25 years . . . that's the unmatched experience of Pipe Line Service!

Experience that's measured in ***thousands of miles!***

Everywhere in the industries we serve, the value of *uniform* pipe protection is becoming more and more widely recognized. The difference between uniform protection and hit-or-miss field work can often mean the difference between future profit and loss.

And so the *experience* of the company that coats and wraps pipe . . . the ability to stick to high standards of uniformity . . . are factors that are being given an extra-careful look. After all, valves, pumps and other components are always accessible for inspection or replacement. But, once pipe is buried, there's only one inspection possible—*the inspection of time!*

That's why Pipe Line Service makes no compromise with the quality of protection that results from *controlled* production—under roof and independent of the weather. That's why we've always pioneered in new processes . . . better machinery . . . closer inspection. For the finest in pipe protection—and for the maximum return on your investment—call in your nearest PLS representative!

Also Sales Offices at
Atlanta, Georgia
Tulsa, Oklahoma
Lincoln, Nebraska
Houston, Texas

Pipe Line Service Corporation

FRANKLIN PARK, ILLINOIS

Quality pioneers in coating and wrapping pipe for a quarter century

Struthers Wells

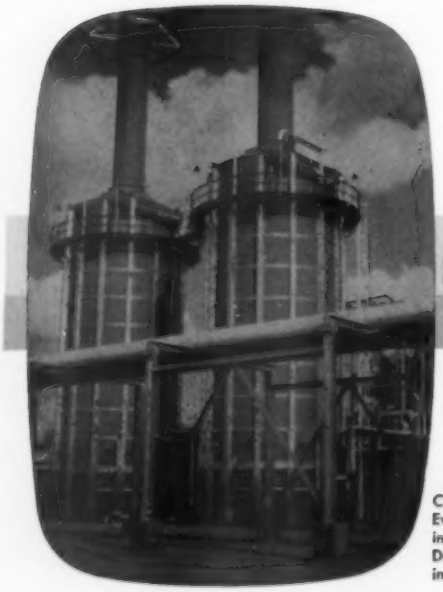
FIRED HEATERS

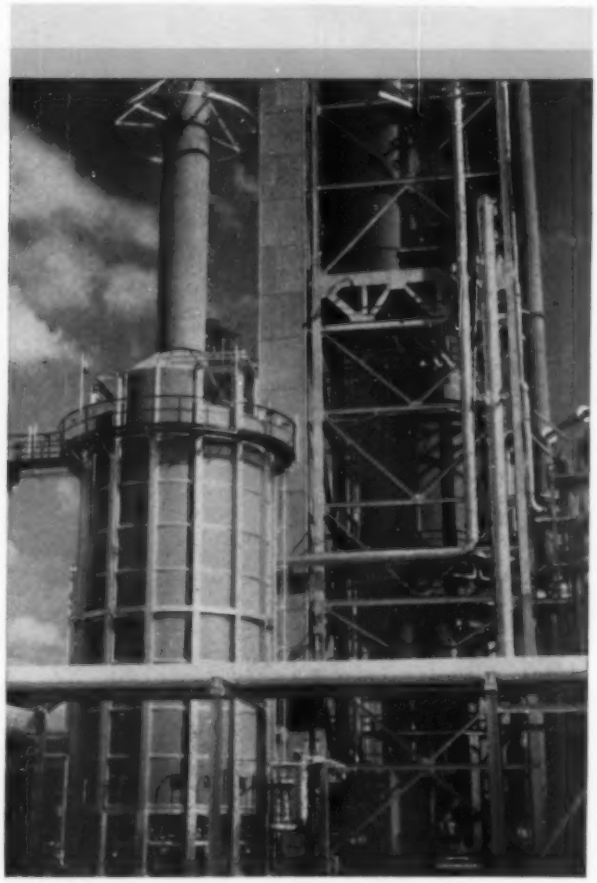
DIRECT OR INDIRECT HIGH TEMPERATURE HEATING for the PETROLEUM AND CHEMICAL INDUSTRIES

DIRECT HEATING
of hydrocarbon oils, gases, for gas cracking, steam superheating and many other services.

INDIRECT HEATING
using Dowtherm, Aroclor, heat transfer oil, liquid metals and other heat transfer mediums.

SPECIAL HIGH TEMPERATURE EQUIPMENT DESIGNED TO YOUR REQUIREMENTS





The photos show two tar separator heaters installed at a new refinery in Mississippi. These heaters are provided with alloy tubes, capacity 54,000,000 BTU per hour each. A total of seven Struthers Wells fired heaters were installed in this plant.

Struthers Wells supplies high-temperature heating equipment for a wide variety of services and industries. Temperatures range to above 1650°F. Struthers Wells heaters are characterized by trouble-free operation, long life and high thermal efficiencies. Hundreds of installations throughout the U.S. and some 15 foreign countries indicate the universal acceptance of Struthers Wells fired heaters.

STRUTHERS WELLS CORPORATION

WARREN, PA. — Struthers Wells — *Offices in Principal Cities*

Plants at Warren, Pa. and Titusville, Pa.

CHEMICAL PROCESSING DIVISION
Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters

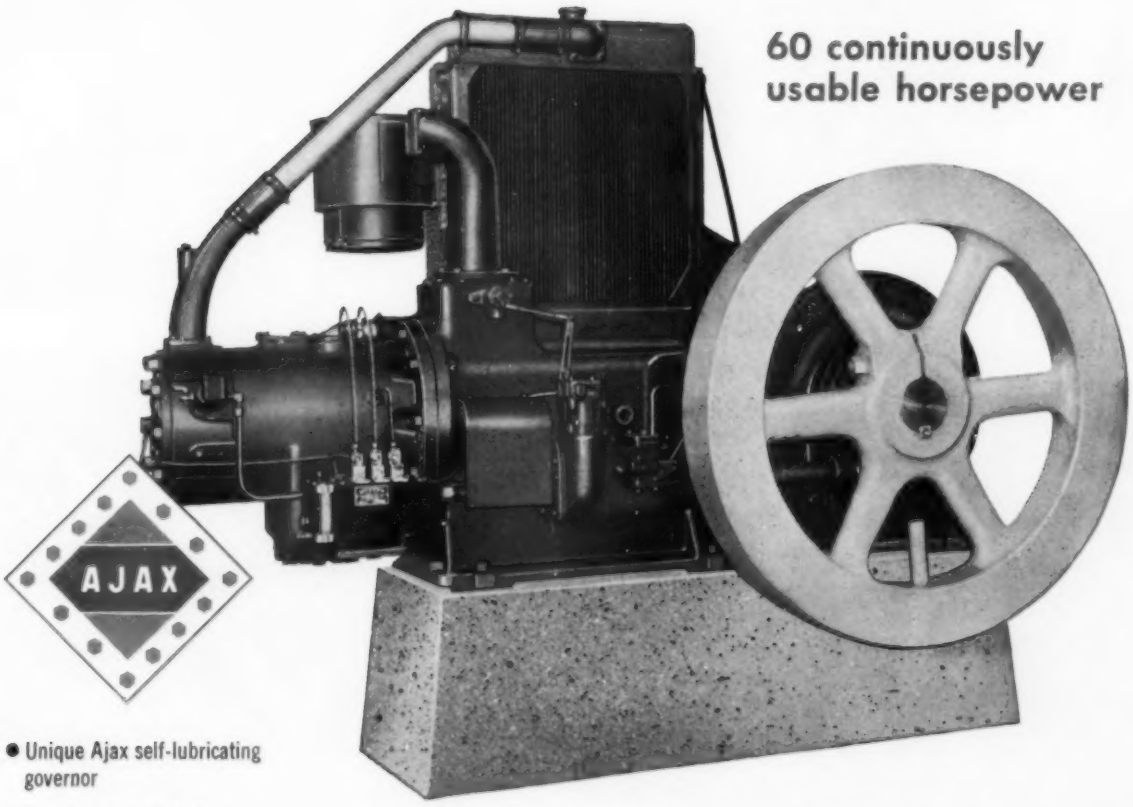
BOILER DIVISION
BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units

FORGE DIVISION
Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening & Back-up Rolls

NEW

ADDITION TO THE MOST COMPLETE GAS ENGINE LINE!

AJAX DP-60 9½ x 12



60 continuously usable horsepower

- Unique Ajax self-lubricating governor
- New improved cylinder lubrication
- Gasoline, electric or air automatic starting
- Improved extra-long-life fan drive
- Extra-large clutch—extra-heavy crankshaft

This brand-new Ajax fills the horsepower gap between the Ajax 8½ x 10 and the Ajax 11 x 14 engines—providing the oil industry with the broadest range of engine capacities for the greatest number of applications in the field, plus AJAX quality throughout! The 60 hp DP-60 features a completely new Ajax governor—self-lubricating, with continuous oil circulation . . . a new improved cylinder lubricator with ever-clear sight feed, permitting precise proportioning of cylinder lubrication . . . automatic starting, equipped for Ajax-developed gasoline, electric or air starting units . . . improved cooling, with extra-long-life fan drive . . . and an extra-large, conservatively rated clutch. ● For complete details, check with your Supply Man now!

AJAX IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM ENGINES

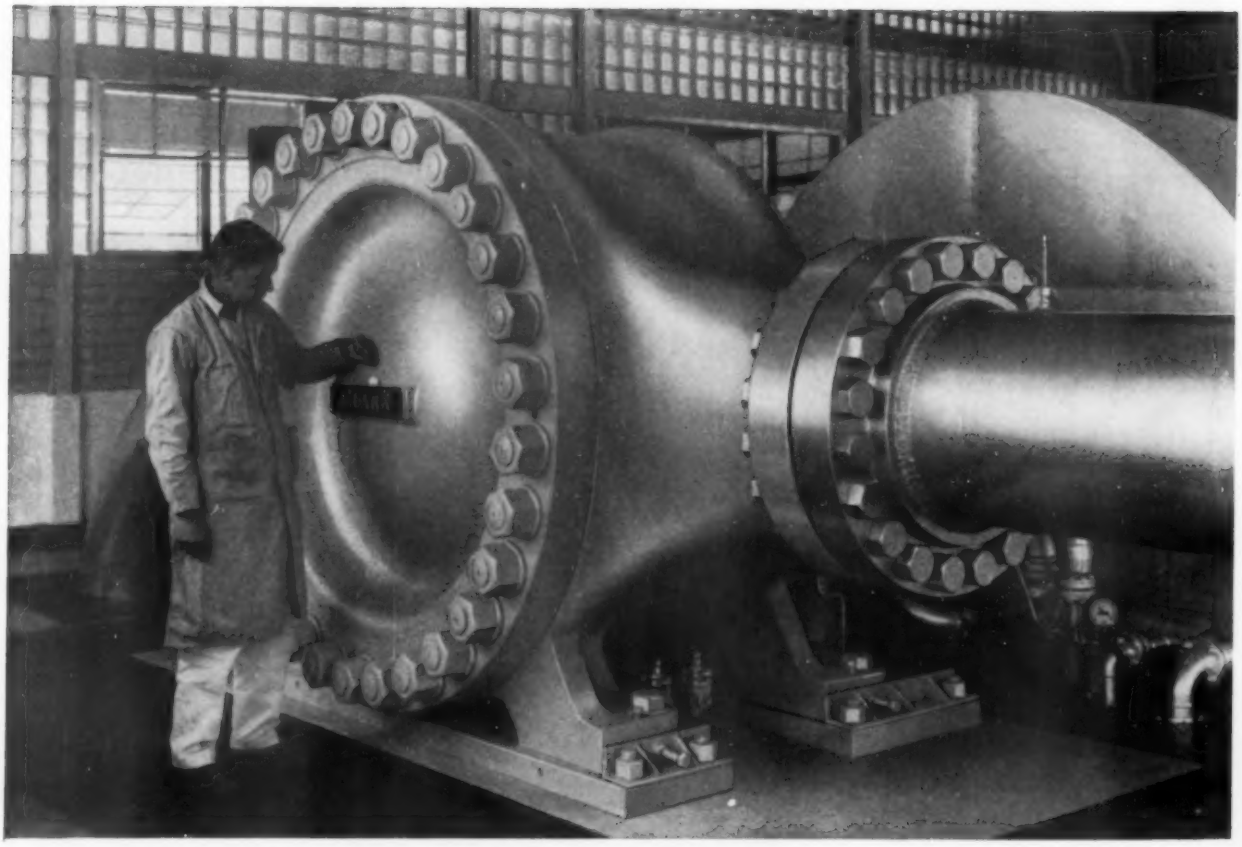
CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.

R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

Only **CLARK** pipeline compressors
give you

EXPAND



Clark Pipeline Compressors are available in five flange sizes: 12x12, 16x16, 20x20, 24x24, 30x30

Here's What Clark Design Gives You

OVER-HUNG CANTILEVER IMPELLER—Only one shaft seal required.

OIL FILM TYPE SEAL—Completely dependable; field-proved; no moving parts.

INLINE SUCTION & DISCHARGE FLANGES—Simple to install; no additional piping; minimum floor space.

EASILY MODIFIED—Extensive changes in pressure-volume characteristics quickly handled by simple internal modification.

RUGGED CASES—Resist stress from pipe expansion. Extra heavy, fully machined studs on bolt circle.

QUIET—Minimum operating noise; easy on operators.

HIGH OR LOW RATIOS—To match pipeline requirements.

ABILITY

They're the boosters with a built-in future

Clark centrifugal pipeline compressors, designed specifically to meet gas transmission requirements, are built to meet the future.

Now extensive changes in operating conditions can be handled within the same case at minimum cost and without sacrificing efficiency. Clark design permits replacement of the volute, as well as guide vanes and impeller, with components having completely different characteristics.

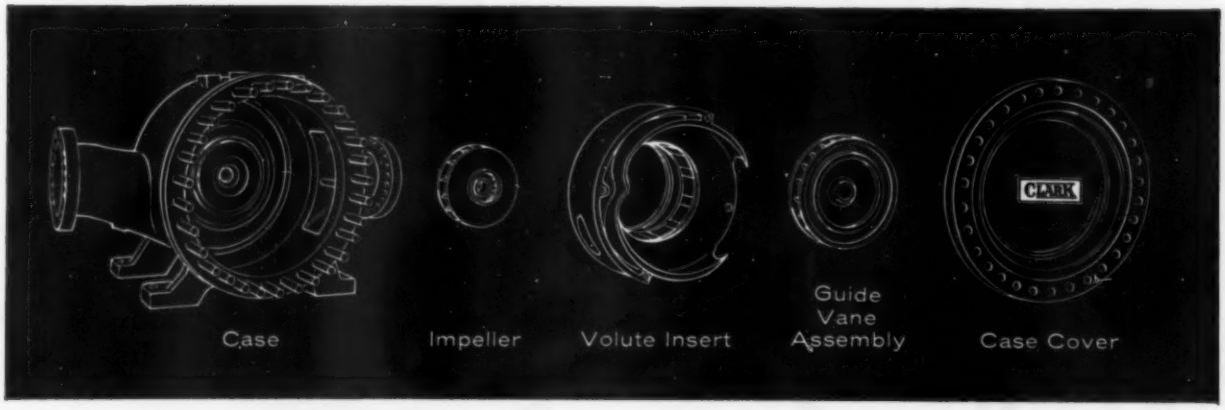
Key to this versatility is the design of the volute as an insert, not as an integral part of the case. Changes are made quickly—just remove the case cover, pull the insert, install a new one. The unit remains perfectly matched, and no piping modification is required.

This versatility is supported by other special Clark features. Extra heavy and rugged cases withstand stress from pipe expansion without distortion. A single oil film type seal provides positive, gas-tight sealing during operation and at shutdown.

Many of these units are operating on the nation's gas transmission pipelines, driven by gas turbines, steam turbines or electric motors. They are supported by Clark's encyclopedia of experience. Your nearest Clark office will gladly give you all the facts and figures.

CLARK BROS. CO. • OLEAN, N. Y. *One of the Dresser Industries*
Sales and Service Outlets in Principal Cities Throughout the World

CLARK **Centrifugal Pipeline Compressors**



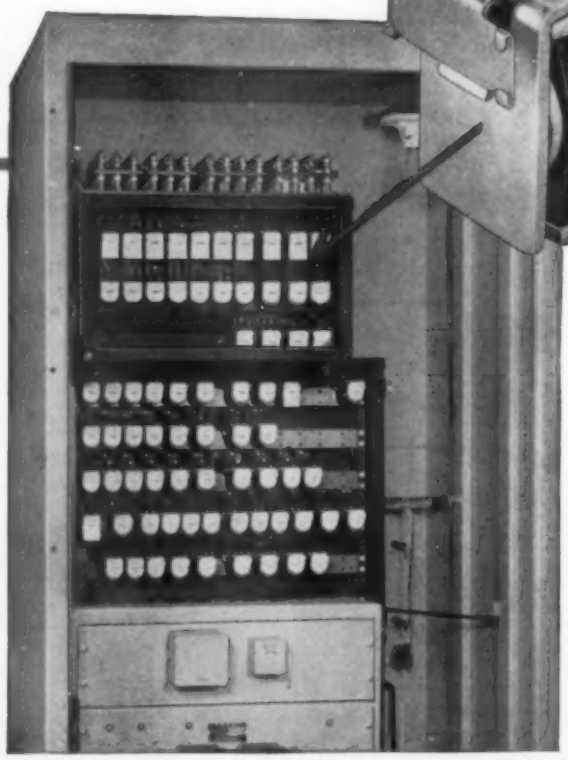
Complete internal assembly is easily interchanged to meet future conditions.

UNION C.T.C. —the pipeline control system with BUILT-IN RELIABILITY

4,000,000 operations a year.

This is regular performance for this L-Type UNION Relay used in the coding unit which transmits and receives all codes. Relays have bifurcated contacts, self-wiping action and chromium plating at the wear points to assure maximum reliability. Coil and contact assemblies are designed to withstand 3000-volt breakdown test.

UNION L-Type Relay



UNION Centralized Transport Control Equipment for the central office (back view) uses plug-connected units for ease of handling.

RELAYS are the key to reliability in Centralized Transport Control Systems—and UNION has been building top-quality relays for more than 75 years.

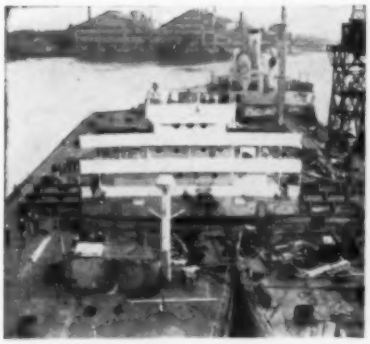
Here's the proof of outstanding performance: 443 UNION relay coding units, the kind used in railroad and pipeline C.T.C. Systems, were brought into the shop for cleaning and repairs. These had been in service without maintenance from one to 10 years. *For 65% of the units, no repairs were required*—only cleaning and adjustment. 10% required slight repairs on the relay contacts. The remaining 25% had been damaged by lightning. The relays in these units averaged about four million operations a year.

This is an example of the reliability that is built into the components used in a UNION C.T.C. System. It means that you can expect a UNION System to go to work and keep on working with the least possible maintenance cost. Write for a copy of our Bulletin 1052.

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
PITTSBURGH 18, PENNSYLVANIA

The *S.S. Gulfbeaver*, first "jumboized" T-2, was converted by Bethlehem's Baltimore Yard in 36 days. "Jumboized," she has an overall length of 572 ft, beam of 75 ft and capacity of 20,168 dwt.

BETHLEHEM'S BALTIMORE YARD COMPLETES FIRST JUMBO T-2



Shifting of the 160-ton midships house from the old to the new and enlarged midbody was accomplished in 16 minutes through the use of an ingenious roller-bearing rail device

The new midbody was floated into dry dock for welding to the original stern, part of which can be seen in the foreground. In the background is the original midbody with bow still attached.

Following joining of the new and enlarged midbody to the stern, this unit was floated into another dock for welding to the original bow section which had been detached from the old midbody.

On April 2, 1957, the 20,168-dwt *S.S. Gulfbeaver,* formerly the 16,500-dwt *Gulfmeadows,* successfully completed her sea trials and became the first "jumboized" T-2 to get into operation.

Only 36 days earlier she had entered Bethlehem's Baltimore Repair Yard for the history-making job. The new midbody section was constructed by Bethlehem's Sparrows Point Yard and towed to Baltimore. Here the Bethlehem repair yard, long a pioneer in complex conversions, tackled the "jumboizing" task and cleaned it up in five weeks.

With 48½ ft added to her length, 7 ft to her beam, approximately 3,500-dwt to her payload capacity and 12 to 15 years to her life, the *Gulfbeaver* is an example of Bethlehem's proven ability to handle all types of ship conversions and repairs with speed, economy and dependability.

SHIP REPAIR YARDS

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Baltimore Harbor — Beaumont, Texas
Los Angeles Harbor — San Francisco Harbor

SHIPBUILDING YARDS

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BETHLEHEM STEEL

Shipbuilding Division

GENERAL OFFICES: 25 BROADWAY, NEW YORK 4, N. Y.

On the Pacific Coast shipbuilding and ship repairing are performed by the Shipbuilding Division of Bethlehem Pacific Coast Steel Corporation

New 350-mile "Oklahoma Extension"

taps new field...

A. O. Smith furnished 262 miles of the 26-inch pipe. Photo above shows some of the difficult conditions encountered in putting in the line.

Natural Gas Pipeline Company of America puts line into service in late November of '57

This new line (mainly 26-inch pipe) allows Natural Gas Pipeline to augment existing supplies from their fields in the Texas Panhandle. With the new line, they'll be able to increase reserves up to 127,000,000 cubic feet per day from new fields in Jack and Wise Counties, Texas.

The Oklahoma Extension will tie in with the Company's mainline at a point near Fritch, northeast of Amarillo. It represents better than a 10% addition to their present pipeline network that includes 1400 miles for affiliate Texas-Illinois Natural Gas Pipeline Company and 1700 miles for Natural Gas Pipeline Company.

262 miles — of 26-inch pipe was furnished by A. O. Smith. In fact Natural Gas Pipeline Company and A. O. Smith have enjoyed a long and mutually satisfactory association. Over 1000 miles of the 30-inch pipe for the previously mentioned Texas-Illinois line was also supplied by A. O. Smith.

For almost 30 years . . . A. O. Smith line pipe has always been manufactured to a high standard of quality . . . precisely controlled at every step of production. That's why A. O. Smith pipe, made and installed in 1928, is still in operation. That's why so much A. O. Smith pipe is in nearly every important high-pressure line.

Through research . . . *a better way*

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CORPORATION

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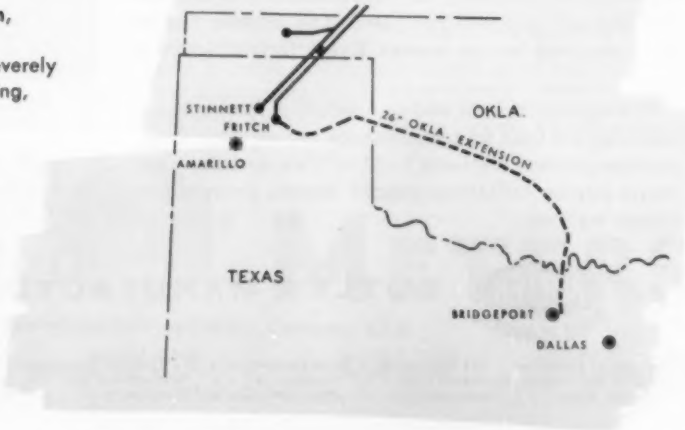
Chicago 4 • Dallas 35 • Houston 2 • Los Angeles 17 • Midland 5, Texas • New Orleans 12 • New York 17 • Tulsa 3 • A. O. Smith International S. A., Milwaukee 1, Wisconsin, U. S. A.

:/expands reserves

Construction of the Oklahoma Extension, a four-month project, included erection of suspension bridges to carry the pipe over severely eroded terrain and a number of soil-conserving, erosion-control dams.



The 350-mile line extends from newly tapped fields in Jack and Wise Counties in Texas and swings north into Oklahoma and then back into the Panhandle to tie in with the Company's existing mainline near Fritch, Texas.

Butler metal building 32 feet by 48 feet used for a pumping station in Houston, Texas.

Butler *metal buildings are a "NATURAL" for the gas and oil industry*

You can house a single pump or an army of compressors with Butler metal buildings. Order the exact building you require right out of inventory from the world's most complete selection of sizes.

Erect it with your own crews, or rely on your Butler Builder's team of construction specialists.

Your Butler metal building is attractive, permanent, and requires practically no maintenance. It is is windsafe, fire-safe and weathersealed. The interior has no posts, the roof has no trusses. Every inch of space is usable.

Throughout the oil and gas industry, Butler metal buildings are used for pump houses, reclamation shops, gas compressor stations, field offices, maintenance shops, engine buildings, supply depots, garages and treater stations.

Butler building used by an oil field drilling company in Pratt, Kansas. Note cement block sidewalls near the office area in front.

For more information on this economical building that is a "natural" for the gas and oil industry, phone your Butler Builder. His name is listed under "Buildings" in the yellow pages of your telephone directory. Or write direct for brochure, "Butler Steel Buildings for the Oil Industry."

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BUTLER MANUFACTURING COMPANY

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for
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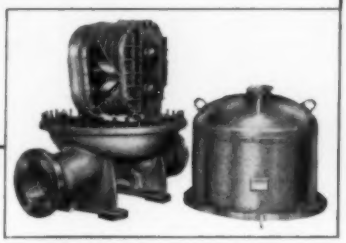
Note compactness and full range of sizes of Brodie Meters — from 1¼" to 12" as shown above.

- 12" or 10" flanges or welding ends — pressures to 300 psi
- Compact in-line design for clean installation in new or existing lines
- Sustained accuracy and low maintenance of exclusive *BiRotor* measuring element
- Complete accessibility for inspection, cleaning, or replacement of unit built assemblies without disturbing line connections



Removal of cover dome gives full access for inspection, cleaning and service. The two fluted rotors are the only moving parts with no metal-to-metal contact in the measuring chamber. Friction free ball bearings, counter and timing gears are fully enclosed away from flowing fluid. 801

Years of high capacity services have proved the basic *BiRotor* design handling everything from heavy crudes to high volatiles. Now, the B-123 offers *BiRotor* performance for critical high capacity services up to 5,000 barrels per hour through a single meter. It's available with a choice of counters, printers, and remote counter system to meet every requirement. For the full story, see your Brodie Metering Specialist, or request Bulletin No. 654.

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M. J. Rathbone, President, Standard Oil Company (New Jersey)

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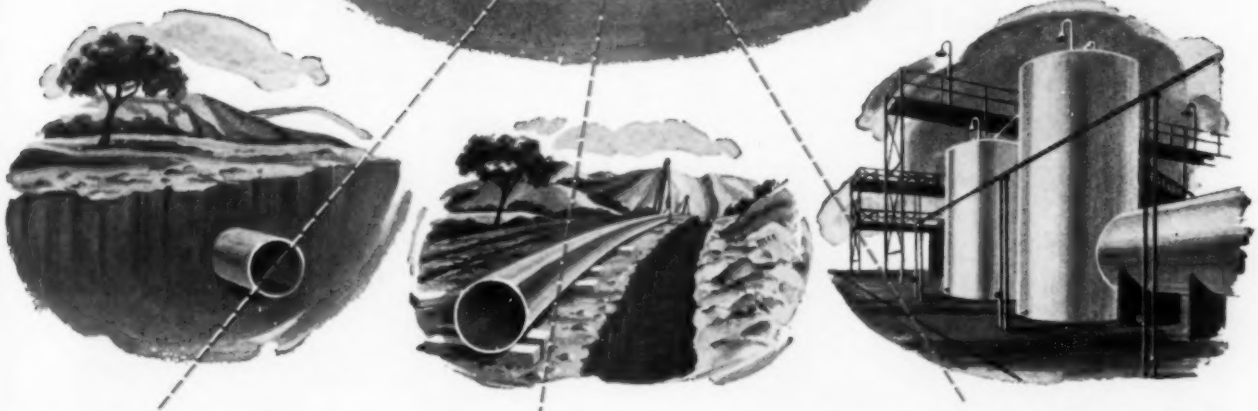
AND AFFILIATED COMPANIES

Whatever your coating problem



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In every phase of the oil and gas industry, Copon Coatings are doing a job reducing corrosion losses. But in many instances, they are accomplishing even more.

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Copon Coatings, and systems for coating underground pipe lines in place or individual joints for new construction, have been developed in close cooperation with leading corrosion engineers. A complete technical service is available. Write today for help with your specific problem.

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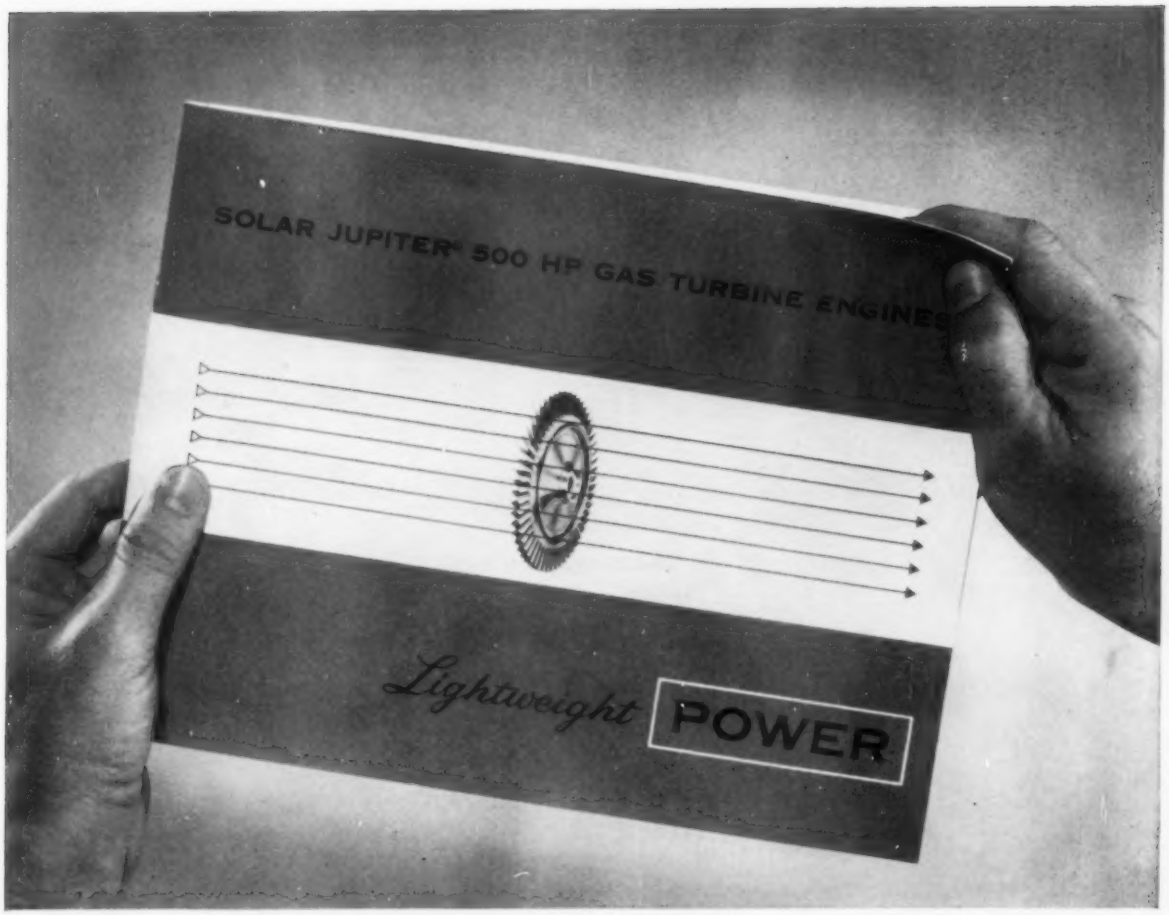

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Solar has prepared a colorful 24-page booklet giving full details about the Jupiter. It contains all of the information necessary to acquaint you with the many advantages of this exciting new engine—and it's yours for the asking. Learn how this power plant of the future can go to work for you—*today!* Write to Dept. D-140, Solar Aircraft Company, San Diego 12, California. *Designers, developers and manufacturers of gas turbines, expansion joints and aircraft engine, airframe and missile components.*

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THE OIL-RESISTANT NITRILE RUBBER

DISCOVERED:

How to compound PARACRIL to make belting and hose jackets that:

- set new standards in abrasion resistance
- have better-than-ever flex life
- have superior ozone resistance
- hold light colors
- are water-, oil-, grease- and flame-resistant
- show good low-temperature flexibility

As a result of extensive research, Naugatuck chemists have developed a new vinyl-modified Paracril® which now makes it possible to produce vulcanizates that are not only oil-resistant but also have the unique combination of properties listed above.

To emphasize its superior ozone resistance, we have designated this new modified nitrile rubber as PARACRIL OZO. Supplied in the form of small flakes for easy handling, PARACRIL OZO broadens enormously the application range of nitrile rubber. Superior rubber jacketing for industrial, garden and petroleum hose and white or pastel-colored rubber conveyor belting covers, are but a few of the many new applications. Another is a shoe soling material which shows flex life and abrasion resistance 2 or 3 times greater than present high-grade, oil-resistant soling materials.

Still another application is wire jacketing, where the unique color stability and superb ozone resistance of PARACRIL OZO opens new possibilities in *colored*, weather-resistant rubber-covered wire.

Technical data on PARACRIL OZO has been published in Bulletin No. 219. Write today for your free copy.

Naugatuck Chemical

Division of United States Rubber Company, Naugatuck, Connecticut

US RUBBER

CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario • Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • CABLE: Rubexport, N.Y.

This wellhead test stand area in our Corpus Christi store is one of six similar field facilities in the United States and Canada.

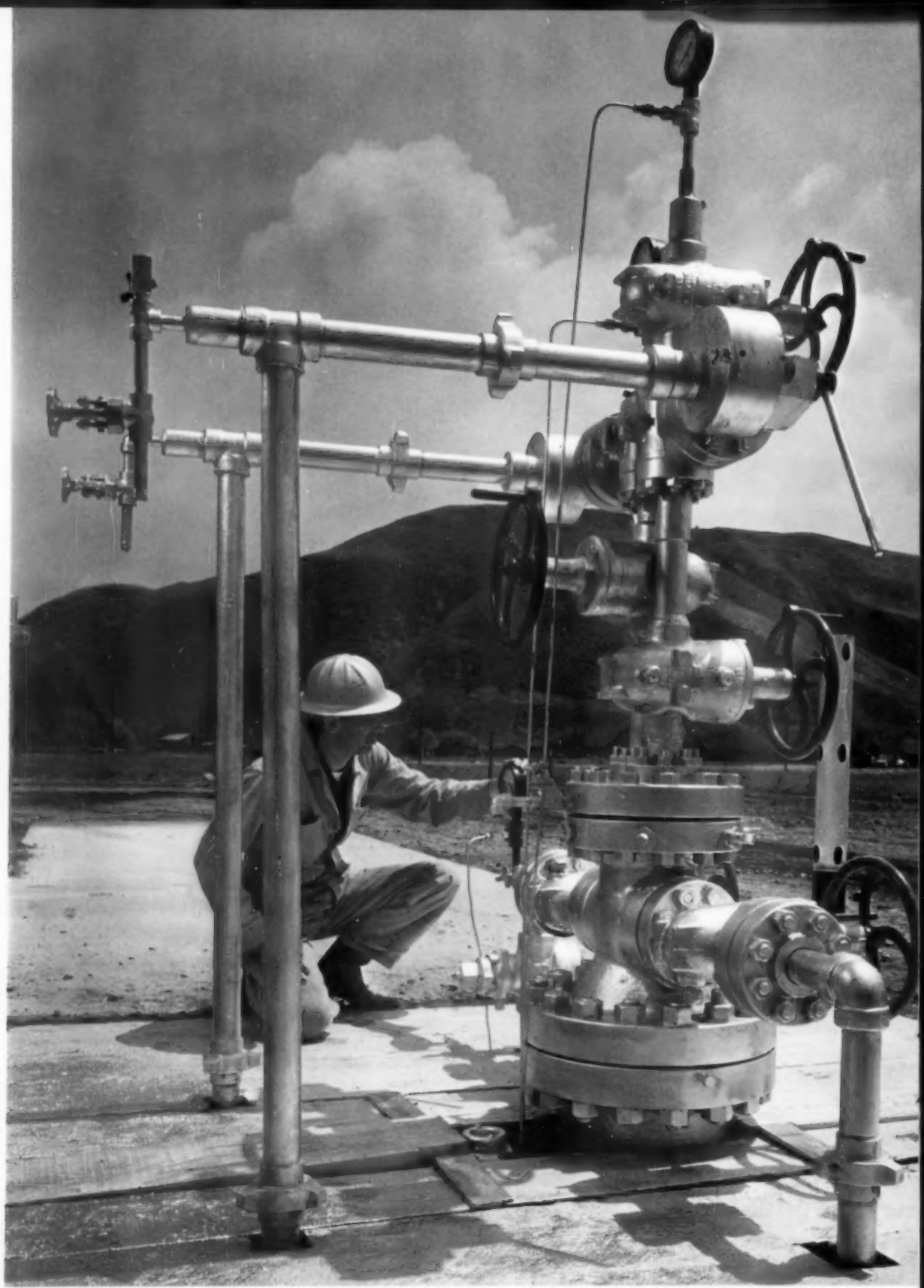
Wellhead test stand is another National field service

When you need repair and reconditioning work on wellhead equipment you usually need it fast. Above all, you must be sure of a unit's safety. For these reasons, National Supply maintains six conveniently-located wellhead test stands in the United States and Canada.

These special field facilities for the hydrostatic testing of wellhead assemblies save more than time. Because they are in, or close to, major production areas, operators save on shipping and handling costs. Add to these benefits the complete line of wellhead parts and specialty items immediately available in National Supply Store stocks . . . and you have the reasons why this wellhead service is so popular.

The next time you need a "like new" repair or reconditioning job on a wellhead assembly, contact the National representative or store personnel in your area. You'll get fast service and thoroughly tested, quality equipment. In fact, these are the same two results you get on whatever you buy from National Supply.

National dual-completion equipment on the next page



This National Supply dual completion wellhead assembly is located near Ventura, California. It utilizes the time-proven Laurent* seal, provides completion cycle "Preventer Control" and sealed-in-steel construction for the life of the well.

You get safe, profitable completions with National dual string wellhead equipment!

All the basic benefits of field-proved National Wellhead Equipment are contained in National's dual string assemblies. Simplicity of design makes them easy to assemble and maintain. Parts are self-locating and self-activating. Interchangeable units provide a flexibility that enables you to "do more with fewer pieces." And, every assembly is intensively pre-tested to insure complete safety.

National offers five types of dual string wellhead equipment designed for safe, profitable completions in a full range of working pressures:

Type DST—Used in any National Type E, W, and B, 6″ nominal size tubing heads over 5½″ or larger casing. Generally installed on dual zone pumping installations requiring a macaroni or vent string.

Type DS-1—These bonnets provide maximum flexibility and greatest economy for shallow or medium depth wells. Ordinarily used on medium pressure wells, they are easily converted to pumping installations.

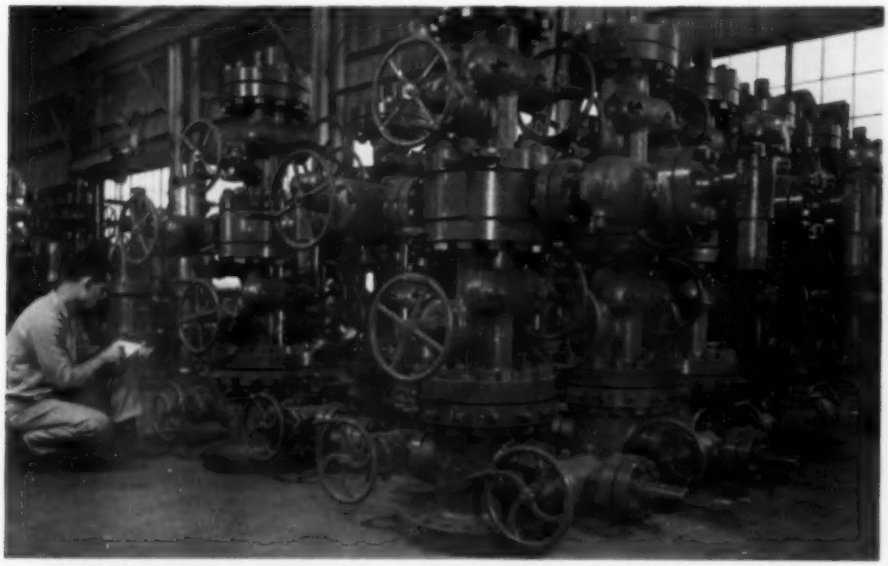
Type DF-1—Similar to DS-1, but incorporating the efficient Laurent* seal. Used for medium or deep wells where independent flanged valves are desirable, and controlled displacement is required.

Type DP-1—Permits "controlled completion." It is supported in a hanger body for suspension of the tubing strings, and allows either string to be pulled, subsequently, without disturbing the other.

Type DP-3—Has an advanced automatic hanger design which eliminates the need for over-size preventers in "controlled completions."

Get the complete story on the benefits of National dual string wellhead equipment from the National representative in your area. It could save you much time and money.

*Patent No. 2,687,229



Serial numbers are checked on these dual completion assemblies ready for shipment from National Supply's Houston Plant. National assemblies for every wellhead condition —as well as advisory service on applications—are available through National Supply Stores.

More National equipment for profitable production on the next page

National Triplex Pumps are reliable on a host of oilfield pumping jobs including water-flooding, salt water disposals, and as power-oil sources for subsurface hydraulic pumps.

...and you get low-cost pumping with National Triplex Pumps!

A minimum of pumping downtime means low-cost pumping, and that's what you get with National Triplex units. They have heavy-duty housings and frames, long-life bearings, stainless steel valves, and National's time-proven lubrication systems.

Plungers, fluid ends and cartridge-type stuffing boxes are readily interchangeable to meet varying pressure and volume needs, and are available for either corrosive or non-corrosive service. In every respect, these triplex pumps show the quality construction for which all National Supply equipment is famous.

Ask the National representative in your area for more information on National Triplex Pumps—and any of the other dependable production equipment shown on this page.

Get reliable service from precision-made National Sucker Rods. They have top resistance to fatigue, shock, corrosion and impulse loads. National Sucker Rods are available in a range of grades to meet every well condition.

National Pumping Units are manufactured in 22 standard combinations, plus various long stroke and portable variations. In the range of API rated beam loads from 3,200 to 32,400 lbs., there's a unit to economically meet your needs.

National Plunger Lift can be the best production method for certain types of wells. It uses formation gas or injected gas for operation, has low initial and service costs. Equipment is also available for gas well operation to remove liquids and maintain a uniform and increased flow rate of gas.

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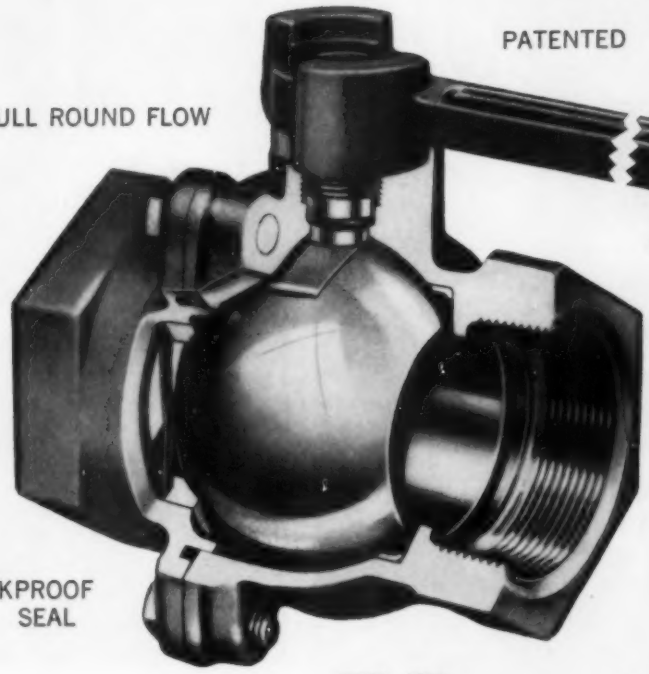

Who sends Valentines to a Rockwood Ball Valve?

Rockwood Ball Valves are operating, without leakage, in plants throughout the country, and the pleased comments we receive read like valentines:

A brewing company has opened and shut their Rockwood Ball Valves over two million times — and their valves are still going strong!

An oil company was surprised (although we don't know why — it's a common occurrence) when Rockwood Ball Valves stopped leakage other valves could not stop.

A company boiling starch found Rockwood Ball Valves lasted longer than any other valve previously used.

A tannery tells us Rockwood Ball Valves are the quickest, easiest valves to open and close.

Frankly, we can't blush — it would be false modesty. Rockwood Ball Valves are perfect for many jobs — we build them that way. They come in all pipe sizes, rated at 300 W.O.G. Tell us where to send it — and we'll give you a booklet with complete information. Valves are tested and listed by Underwriters' Laboratories, Inc. Distributors in principal industrial areas.

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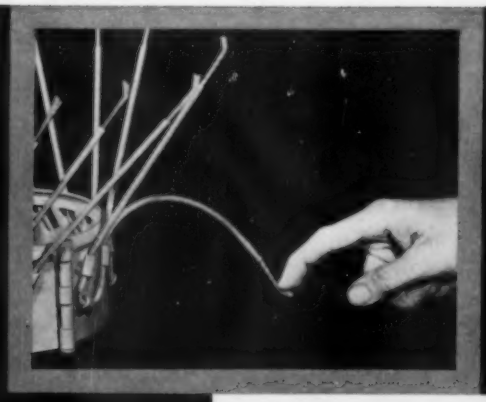
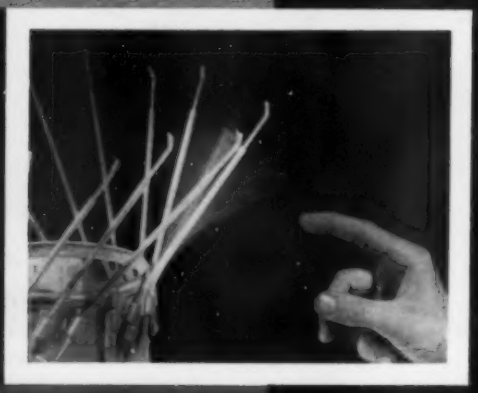
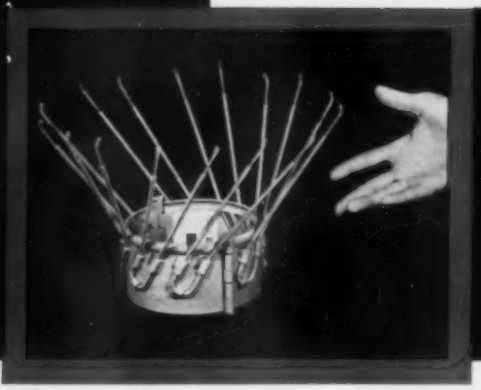
BJ RED TOP
SCRATCHERS–

The Spring is the thing!







BJ's exclusive coil-flex fingers assure you a better scratching job every time!

Look at the way the coil-spring-enclosed scratching fingers always bounce back to their original shape and position. The same thing happens when your BJ Red Top Scratcher is down hole. You get a better scratching job with fewer strokes because, unlike with an ordinary straight-wire scratcher, the Red Top's fingers never get kinked or bent out of shape—neither during installation nor in use—but stay at peak efficiency throughout their use.

Only the BJ Red Top scratcher has double-spring construction throughout. Each finger has a cluster of straight wires—for better scratching—encased in a tight coiled spring—for positive bounce-back.

Byron Jackson Scratchers are manufactured in sizes to fit all API casing OD's from 4½" to 13⅜". Every model features a sturdy hinged clamp-around design.

Specify BJ Red Tops next time and assure yourself better scratching and better cementing. They're sold through recognized supply stores and stocked in all BJ warehouses.

Byron Jackson Tools, Inc.

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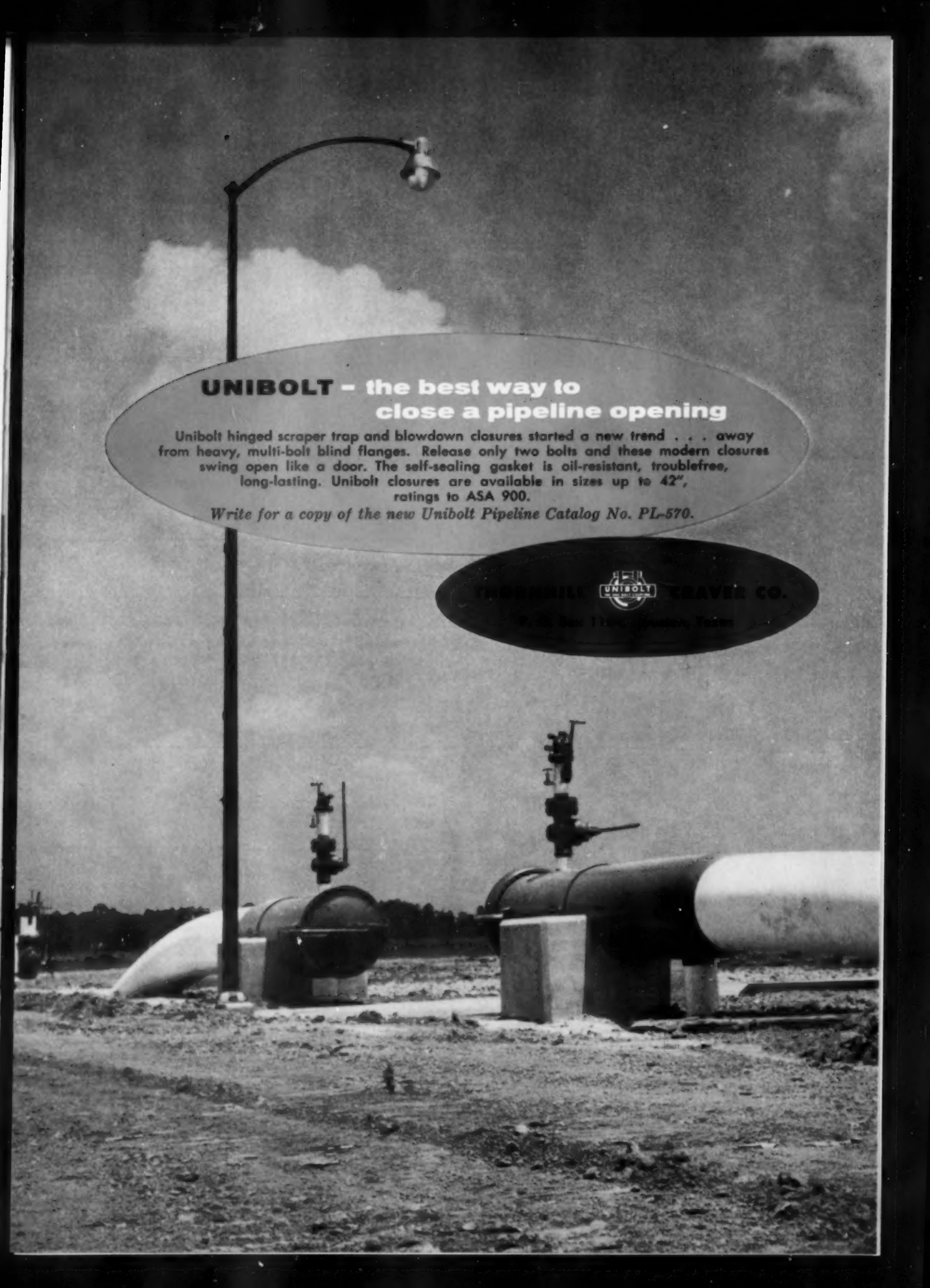
FOR THE
NEWEST

The spring's the thing with BJ Red Top Centralizers too.

Write for literature that describes their unique design and operation.


UNIBOLT – the best way to close a pipeline opening
Unibolt hinged scraper trap and blowdown closures started a new trend . . . away from heavy, multi-bolt blind flanges. Release only two bolts and these modern closures swing open like a door. The self-sealing gasket is oil-resistant, troublefree, long-lasting. Unibolt closures are available in sizes up to 42", ratings to ASA 900.
Write for a copy of the new Unibolt Pipeline Catalog No. PL-570.
UNIBOLT
CRAVER CO.

NEW INTERNATIONAL®
330 UTILITY TRACTOR

NOW! MORE 'BEEF'

than ever before in a 35 hp rig!

It's terrific for trenching, loading, 'dozing! Now you can get an International tractor in the economical 35 hp class, with strength and stamina for high capacity and low maintenance. The new International 330 Utility has up to 900 pounds greater built-in weight than other tractors of similar horsepower—really *rugged* construction! Handle 1,000 pounds with a front-end loader, lift 4,000 pounds with rear-mounted fork, dig faster with heavy-duty backhoe.

ALL the work-easing features of larger IH tractors are available—10 speeds forward with Torque Amplifier drive . . . power steering . . . job-tailored Hydra-Touch equipment control . . . Fast-Hitch.

See how heavy-duty design can cut your costs! Look in the classified directory . . . phone your IH Dealer. For free catalog, write International Harvester Co., Dept. OGJ-1, P. O. Box 7333, Chicago 80, Ill.

SEE YOUR
INTERNATIONAL HARVESTER DEALER

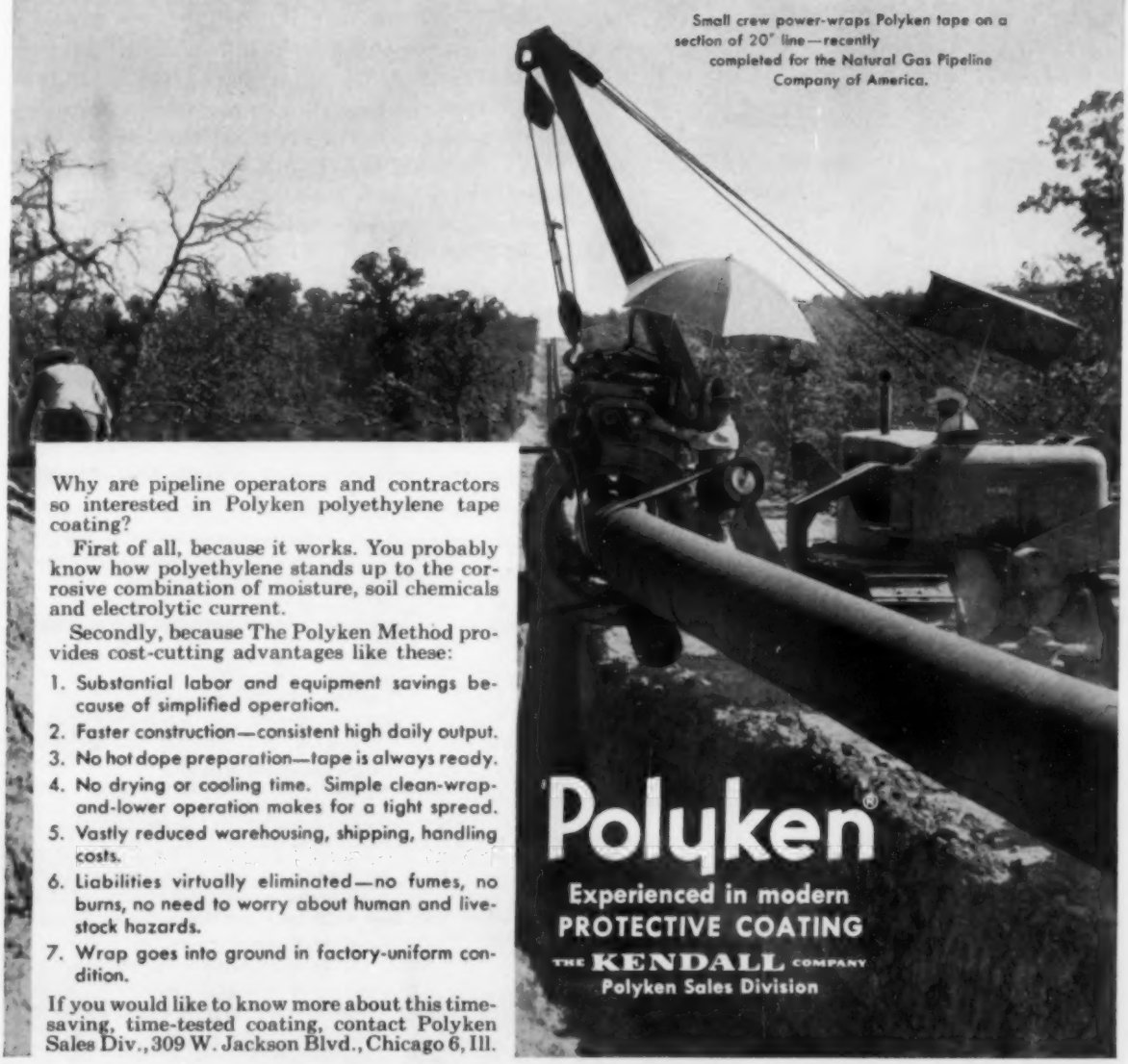
International Harvester Products pay for themselves in use—Farm Tractors and Equipment . . . Twine . . . Commercial Wheel Tractors . . . Motor Trucks . . . Construction Equipment—General Office, Chicago 1, Illinois

International tractors with matched loaders and backhoes are now available as complete units—backed by unexcelled IH facilities for parts, service, and financing. Above, the new International 330 Utility tractor equipped with International Wagner backhoe and loader. Below, the 330 Utility with International Pippin units.

For extra-rugged service, ask your IH dealer to show you the husky, 45-hp International 350 Utility . . . Over 5,500 lb drawbar pull. Below, ½-cu yd rear-mounted rotary scoop.

Big-Inch pipeline wrapped the modern way

Polyken Tape saves time, labor and handling costs, yet resists corrosive attack as only polyethylene can



Small crew power-wraps Polyken tape on a section of 20" line—recently completed for the Natural Gas Pipeline Company of America.

Why are pipeline operators and contractors so interested in Polyken polyethylene tape coating?

First of all, because it works. You probably know how polyethylene stands up to the corrosive combination of moisture, soil chemicals and electrolytic current.

Secondly, because The Polyken Method provides cost-cutting advantages like these:

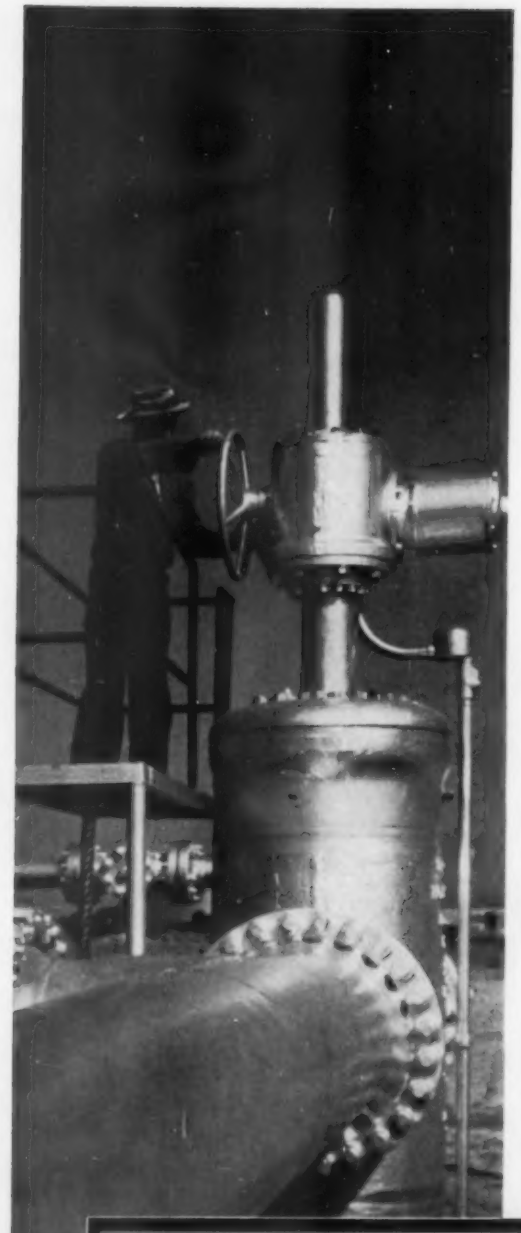
1. Substantial labor and equipment savings because of simplified operation.
2. Faster construction—consistent high daily output.
3. No hot dope preparation—tape is always ready.
4. No drying or cooling time. Simple clean-wrap-and-lower operation makes for a tight spread.
5. Vastly reduced warehousing, shipping, handling costs.
6. Liabilities virtually eliminated—no fumes, no burns, no need to worry about human and livestock hazards.
7. Wrap goes into ground in factory-uniform condition.

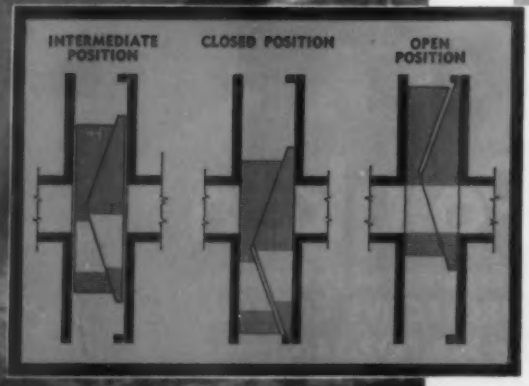
If you would like to know more about this time-saving, time-tested coating, contact Polyken Sales Div., 309 W. Jackson Blvd., Chicago 6, Ill.

Polyken®

Experienced in modern PROTECTIVE COATING

THE KENDALL COMPANY
Polyken Sales Division





At the Operator's Command...

W-K-M

Controlled Force Seating

The operator has complete control of the sealing action of W-K-M Parallel Expanding Gate Valves. Sealing is not dependent on either the line pressure or on stress wedging the gate in the valve.

When the W-K-M Valve gate unit reaches the full open or closed position, the torque applied by the operator through the stem forces the gate and segment to expand against the seats to form a perfect seal, upstream and downstream. CONTROLLED FORCE SEATING is completely independent of outside factors. Neither high nor low pressure nor line pressure fluctuation has any effect on the seal of W-K-M Valves.

When the valve is being opened or closed the CONTROLLED FORCE SEATING action is released and the gate unit is held in a collapsed position. This provides a slight clearance between the faces of the gate and the seating rings, allowing the gate to move freely.

Through-Conduit • Pressure Seal Bonnet • Enclosed Packing Gland • Superfinished Stems • Full Repair While Installed • Working Pressures to 2,000 lbs. WOG • Sizes 2" through 30".

W-K-M
DIVISION OF ACF INDUSTRIES INCORPORATED

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For design and operating features, sizes, pressures and complete dimensions, write Dept. A-120 for W-K-M Through-Conduit Gate Valve Catalog 300.

5716

MANUFACTURERS OF W-K-M GATE VALVES ACF LUBRICATED PLUG VALVES
KEY-KAST ALLOY STEEL PIPING FITTINGS KEY RETURN BENDS AND FITTINGS

They Say—

Argentine pipe being used

Dear Sir:

Page 78 of your number of November 25, 1957, gives interesting details of a new pipeline to be shortly laid from Sicasica in Bolivia to Arica in Chile.

We would like to point out that the 8-inch part of it, which covers about 80 km. in a very sharp drop from the Bolivian plateau to the Pacific Coast, is to be provided by our firm, Dalmine Safta, with works in Campana, Argentina, capable of producing yearly some 70,000 tons of seamless API pipe up to 8⅝ inches.

As a matter of fact, the contract has already been signed with YPFB and deliveries are to start next February.

This is not our first export business as we have already sent seamless steel API pipe to Venezuela and Turkey.

May we tell you that we fully enjoy at Dalmine Safta all the features of The Oil and Gas Journal, especially some pieces of dry humor in Journally Speaking.

Dalmine—S.A.F.T.A.
Soc. Argentina Para la Fabricacion de Tubos de Acero
Buenos Aires, Argentina.

Steel drop not serious

"Last year Tennessee Coal & Iron (Division of United States Steel Corp.) operated at less than 90 per cent of capacity. That is a bit lower than our operating rate of some previous years, but still a good year.

"TCI's lower rate of production is in keeping with a nation-wide downward trend in steel activity and is by no means a localized situation. This decline in production, however, only in small part reflects a weakening in actual steel use. It is primarily the result of a reversal in steel consumers' inventory policy from stock accumulation to liquidation, and it is probable that inventory-building will once more be resumed before the end of 1958.

"Moreover, merely quoting our operating rate as a percentage of our rated production capacity does not present a true picture of the situation. Because . . . our production capacity has been increased tremendously

TESTED IN OPEN COMPETITION

. . . and ANOTHER Pipe Line Company CONVERTS TO John Crane®

8-B SEALS

A COMPETITIVE FIELD TEST in which one half the pumps were equipped with JOHN CRANE 8-B Seals and the other half with various competitive seals was recently conducted by a leading pipe line company.

THE RESULT showed that in *every* case the JOHN CRANE 8-B Seals out-performed all other seals in the system both in positive sealing and length of service.

PROOF AGAIN that wherever service is tough and pressures are high, 8-B Seals successfully do the job.

JOHN CRANE 8-B Seals are easily installed and will handle all pressures encountered in modern pipe lines. They are available in a full range of shaft sizes for every main line or tank farm pump service.

Request Bulletin S-215-1. Give mechanical and service details for specific recommendations.

•

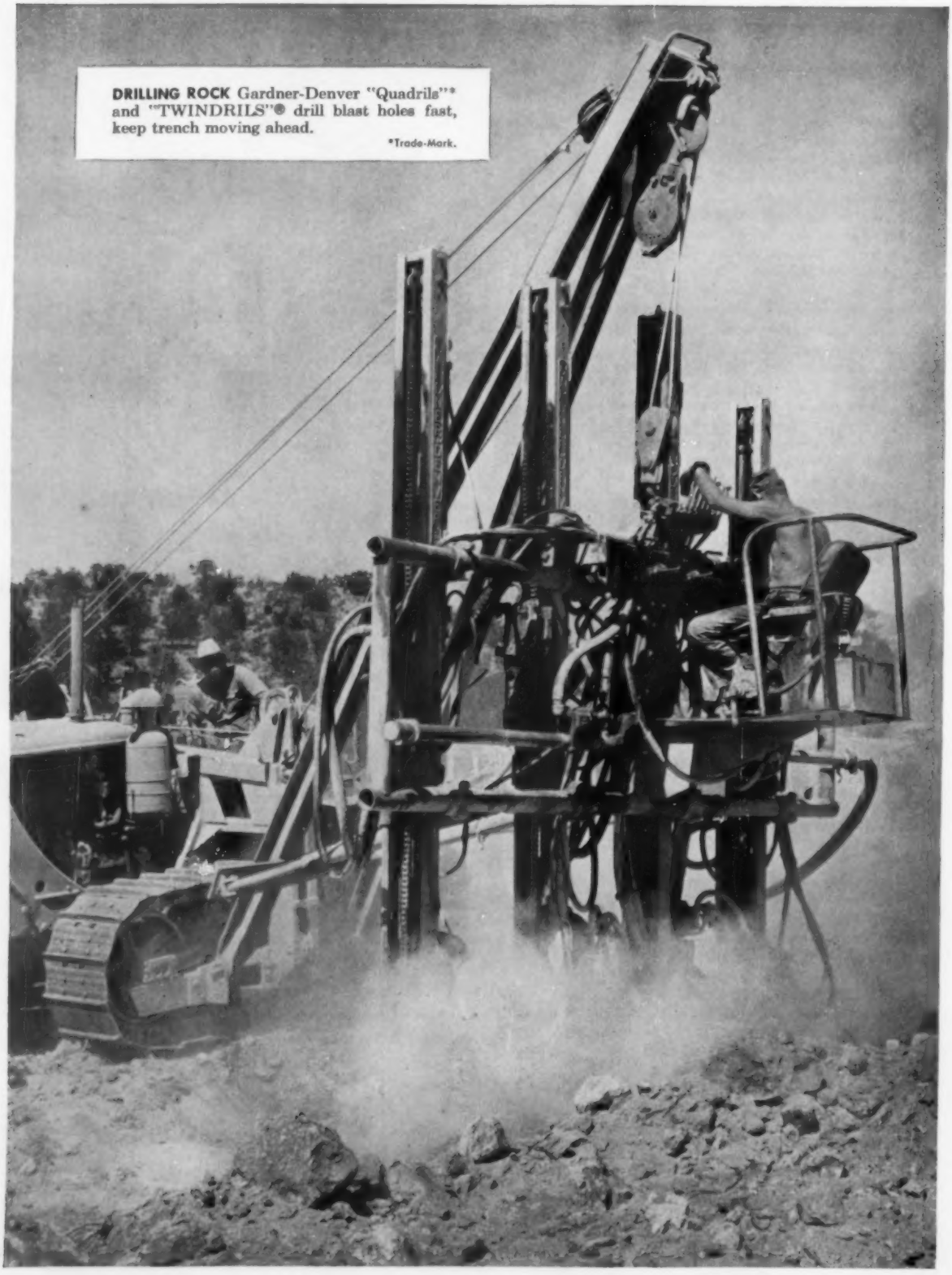
Crane Packing Company, 6419 Oakton Street, Morton Grove, Illinois (Chicago Suburb)

In Canada: Crane Packing Company, Ltd., Hamilton, Ont.

John Crane — MECHANICAL PACKINGS · SHAFT SEALS · TEFLON PRODUCTS · LAPPING MACHINES · THREAD COMPOUNDS

CRANE PACKING COMPANY

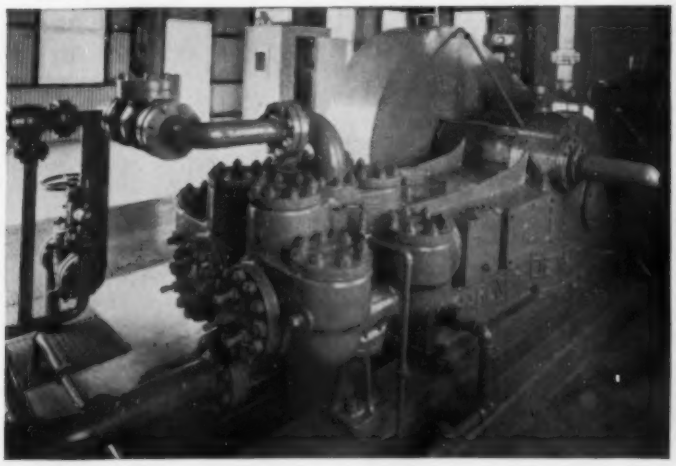
Gardner-Denver Quality--on



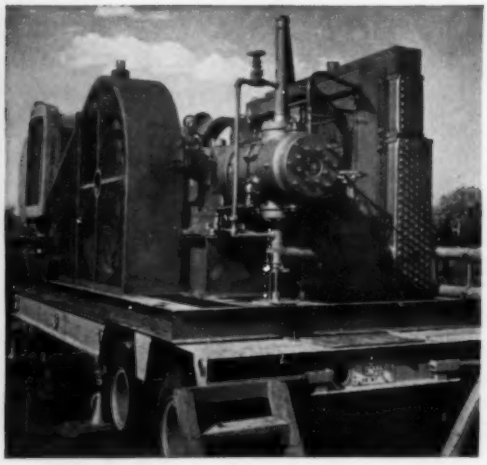
DRILLING ROCK Gardner-Denver "Quadrils"* and "TWINDRILS"® drill blast holes fast, keep trench moving ahead.

*Trade-Mark.

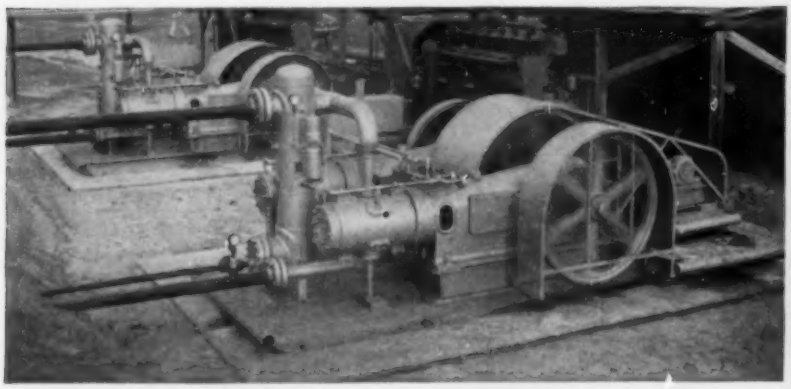
the line from start to finish



PUMPING OIL—Quality Gardner-Denver power pumps for gathering and transmission service.



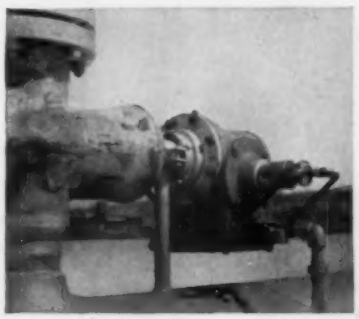
TESTING LINE—A wide range of portable and skid-mounted compressors for testing line under air pressure.

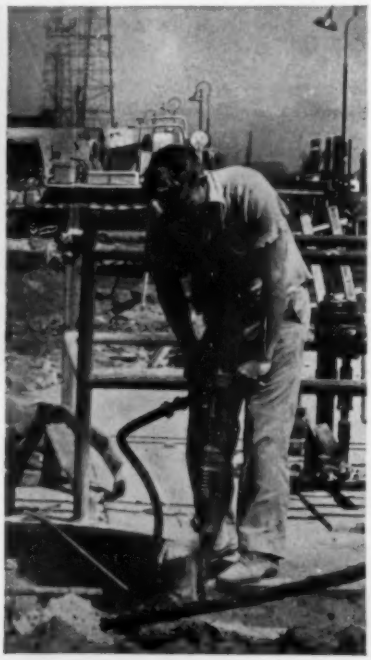


BOOSTING GAS—Booster compressors available to meet capacity and pressure requirements.

OPERATING VALVES—Non-sparking Gardner-Denver air motors for remote-control operation of pipeline valves.

Write for detailed information or visit your nearest Gardner-Denver branch office today.





SPEEDING MAINTENANCE—A complete line of air tools for construction and maintenance work.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois—In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario—Gardner-Denver Export Division, 233 Broadway, New York, N. Y. Oil Field offices: Dallas, Houston, Tulsa, St. Louis, Los Angeles, New York, Pittsburgh, Denver, New Orleans, San Francisco, Kansas City, Winnipeg, Edmonton.

See it and you'll believe it—the
Harbison-Fischer
Texas Stripper Rod Pump
—the pump that won't sand up.
It's especially recommended
for shallow, sandy, stripper wells.
There are dozens and dozens of
these pumps in successful
operation throughout the oil
patch. Ask your store or the
Harbison-Fischer representative
in your area to tell you about
one running near your lease
"Best Pumps in the Oil Patch"®

during the past decade, we can produce as much steel at 71.3 per cent of capacity now as we could at 100 per cent of capacity 10 years ago.

"Some slackening of business was to be expected.

"It has been apparent for months that existing capacity is more than adequate to satisfy demand for the end products of most consuming industries, and it was only a question of time before the plant and equipment boom begun in 1955 would start to reverse itself. Since demand for consumer goods has not yet increased sufficiently to take up the slack occasioned by the drop in capital goods output, over-all industrial production will ease off slightly during early 1958.

"However, I am convinced that the vigor and momentum of our economy will not be restrained for long. There is every reason to anticipate continued growth in consumer buying."

Arthur V. Wiebel, president, Tennessee Coal & Iron Division of United States Steel Corp., in a statement to the press.

What's at stake in Oklahoma

"The issue at stake (in the Oklahoma Corporation Commission's contempt citation against Gulf Oil Corp.) is not, as publicity representatives of major importing companies assert, whether a company can be forced to purchase crude oil it does not want to buy. This was never an important issue in the controversy, and the recent sale of Gulf's Oklahoma gathering system has eliminated the question altogether.

"The true issue at stake is whether the Corporation Commission has the power . . . to promulgate and enforce rules to prevent wasteful, unratable, and discriminatory taking of crude oil. Also at stake is whether a pipeline common purchaser of crude oil owes any public duty to the state or the producers it serves; or whether its obligation as to facilities and service is to be measured by personal profit alone. . . .

"It is also obvious that it is useless to attempt to regulate production of oil in the interest of conservation without the power also to reasonably regulate the taking of crude oil. The allowables established by the commission are based upon the market demand for each common source of supply, considering the needs of all purchasers and the market demand for Oklahoma oil, rather than being dictated by the desires of one purchaser alone.

"If such a purchaser can with impunity cut purchase to 80 per cent of allowables, it can cut them to 5

Good equipment PUTS *Pride* IN A GOOD CREW

When there's pride in equipment, a good crew does a better job.

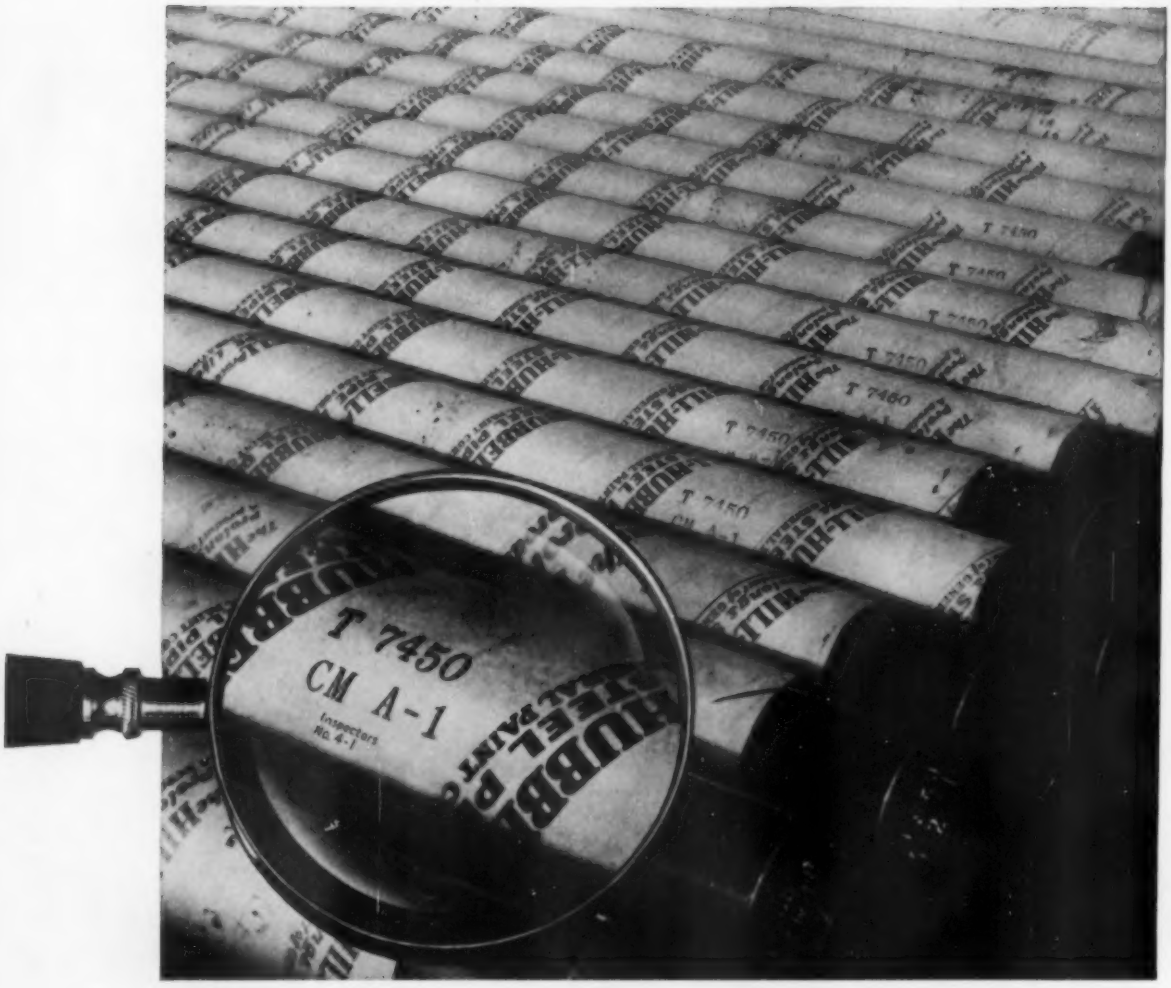
Franks Rocket – favored among contractors, crews, and oil companies alike – is designed for speed with ease of operation and safety.

Rig-up is faster. The telescoping derrick remains strung during moves. The derrick raises hydraulically. Leveling is simple, fast. Only guy lines to unit needed.

Operation is faster with the air lift transfer. Models from 6,500 to 12,000 ft. See a Franks representative for details or write.

FRANKS DIVISION
Cabot Shops, Inc.
Pampa, Texas

WELL SERVICING AND DRILLING UNITS
FRANKS
DIVISION OF
CABOT
PAMPA, TEXAS



What? Autograph a piece of pipe?

Yes! The numbers stamped on Hill-Hubbell pipe wrapping are the job number, specification and signature of the man who inspected that pipe. When a Hill-Hubbell inspector signs a pipe he identifies the job and gives you his personal guarantee that the pipe is protected perfectly... permanently... to the ordered specifications.

Hill-Hubbell inspectors use modern electronic testing equipment to check every square inch of every pipe before it leaves the factory. In the field the stamp identifies the pipe as to job and specification. Hill-Hubbell inspectors have autographed pipe for 25 years... another "Quality-Control" first, pioneered by Hill-Hubbell.

Specify Hill, Hubbell wrapped pipe on your next job

FACTORY APPLICATORS OF COATINGS AND WRAPPINGS

HILL·HUBBELL & COMPANY

DIVISION OF GENERAL PAINT CORP. • 3091 MAYFIELD ROAD, CLEVELAND 18, OHIO

per cent; and it can apply different percentages in different areas, as suits its profit and convenience. The chaos necessarily resulting from uncontrolled purchaser proration would soon rival that of early day Cushing, Healdton, and Glenpool, where the discriminatory taking of the producers owning pipelines led to the enactment of the Oklahoma Pipelines Act, imposing strict public duties upon pipeline common purchasers."

Oklahoma Independent Petroleum Association letter to members.

Canada gets a raw deal

"What about this matter of oil and defense? Of all our multitudinous allies of varying size and stripe the Canadians are the ones bound most tightly to us. Geography alone makes this so, besides similarities of people and ideals.

"Canadian fighter planes are commanded by U. S. generals; U. S. soldiers man the Distant Early Warning radar network far in the Canadian north. Certainly, if war came, the Canadian oil fields—some of them closer to the West Coast than some U. S. oil fields—would be an integral part of the U. S. defense program.

"But in the new (West Coast imports) cutback, Canadian oil is to be accorded the same treatment as Middle East oil under the name of 'defense'. And that brings under question the whole import-cutting program. For it would appear that in this case, at least, what is really being defended by this artificial federal restriction is the competitive position of the marginal U. S. oil producer."

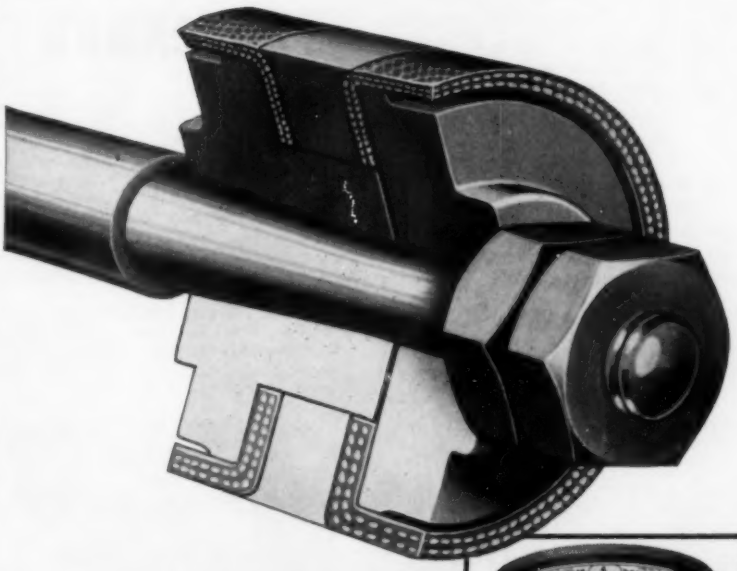
Editorial in the Wall Street Journal.

The odor of oil

"Congress has been sniffing the air that surrounds the industry and it doesn't like the smell. The ill-timed price increases touched off congressional and federal court hearings. Legislation on imports was threatened, and the threat still hangs heavy over the heads of the importers.

"A question has also been raised concerning the propriety of continuing the 27½ per cent depletion allowance on oil expenditures abroad. This question will undoubtedly be asked again—and more insistently. The natural-gas bill stands a poor chance of passage in the present atmosphere and is likely to be branded guilty by association . . .

"The oil industry ought to realize when it is well off. While it wrangles within itself, the administration is fighting its battle for it. The IPAA



WHY PUMCUPS MAKE A DIFFERENCE

Darcova Pumcup

Darcova 45° Bevel Type Pumcup

- in reciprocating pumps
- in air and hydraulic cylinders

With Darcova Pumcups in your cylinders, there's less fluid slippage. High volumetric efficiency is maintained and Pumcups outlast other packings at least 3 to 1! There's less down-time! Lower power cost! Smoother operation! Less maintenance and replacement!

Longer life is the result of truly advanced cup engineering, including 100% nylon composition, plus a choice of types, textures and precision sizes to exactly match fluid, cylinder, pressure and temperature conditions.

These same factors contribute to prolonged high efficiency by permitting full advantage of the "cup principle". Thus fluid pressure always keeps Pumcups snug against cylinder wall, despite eventual wear, while the total frictional load is minimized.

Send for Bulletin 5503. It will give you *all* the facts.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP

TRADE MARK
PUMCUPS

must know that legislative controls, once applied, are forever extended, never rescinded. It must know that oil men will fare no better under a Democratic administration, for Adlai Stevenson in . . . 1956 declared that 'Our international economic policy must insure a steady and adequate flow of raw materials from abroad . . . to reduce costs of foreign supplies, to postpone exhaustion of domestic resources, to avoid excessive costs of marginal subsidized home production . . .'"

GeoSurveys, in a statement to the press.

CALENDAR

JANUARY

20-21 Compressed Gas Association, Inc., forty-fifth annual meeting, Waldorf-Astoria, New York.

21 Indiana Oil and Gas Association, American Petroleum Institute Illinois Basin chapter, joint winter meeting, McCurdy Hotel, Evansville, Ind.

24 Southern Gas Association, transmission section roundtable conference on pipeline engineering, Hilton Hotel, El Paso, Tex.

29-31 Ninth annual Institute on the Law of Oil and Gas Taxation, sponsored by Southwestern Legal Center, Dallas.

31 Natural Gasoline Association of America, regional meeting, Skirvin Hotel, Oklahoma City.

FEBRUARY

3-4 Instrument Society of America, chemical and petroleum industry symposium on progress and trends in chemical and petroleum instrumentation, Hotel Du Pont, Wilmington, Del.

5-6 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Ben Milam Hotel, Houston.

12-14 National Association of Corrosion Engineers, Tulsa section, ninth annual corrosion short course for pipeliners, Mayo Hotel, Tulsa.

13-15 National Society of Professional Engineers, spring meeting, Michigan State University, East Lansing, Mich.

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

20-22 Pipe Line Contractors' Association of Canada, annual convention, Empress Hotel, Victoria, B. C.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

3-4 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fourth annual joint meeting of Rocky Mountain petroleum sections, Cosmopolitan Hotel, Denver.

5-6 Gas Conditioning conference, sponsored by the University of Oklahoma, Oklahoma Memorial Union Building, Norman, Okla.

7 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

10-13 American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, forty-third annual meeting, Biltmore Hotel, Los Angeles.

12-14 American Petroleum Institute, Division of Production, southwestern district meeting, Hotel Texas, Fort Worth.

17-21 International Atomic Exposition, Inc., 1958 Nuclear Congress, Chicago Amphitheatre, Chicago.

17-21 National Association of Corrosion Engineers, annual conference, civic auditorium, San Francisco.

20-21 New England Gas Association, annual meeting Hotel Statler, Boston.

20-21 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, regional conference on production and reservoir engineering, Mayo Hotel, Tulsa.

24-26 Midwest Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

24-26 Western Petroleum Refiners Association, annual meeting, Hilton Hotel, San Antonio, Tex.

27-29 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Southwest conference, St Francis Hotel, San Francisco.

31-April 2 American Petroleum Institute, Division of Transportation, annual pipeline conference, Jung Hotel, New Orleans.

APRIL

1-3 University of Oklahoma, fifth annual

This **DELTA "NOMAD"** solves the problem of a **COMPLETELY SELF-CONTAINED LUBRICATING UNIT** to service plug valves anywhere in your plant or properties!

Speeds maintenance operations. Saves lubricant-starved valves. Eliminates high-pressure air lines. The DELTA "NOMAD" MOBILE LUBRICATING UNIT mounts compactly in a pick-up truck or other vehicle. It is designed for large capacity and volume delivery of approximately 1½ pounds per minute. 70 to 1 pressure ratio with sealed-in air operated motor. Special power booster provides FULL PRESSURE INSTANTLY at gun control handle and button head coupler.

The DELTA "NOMAD H-70" pictured, handles 40-lb. drum of Desco Lubricant that is easily changed without mess or waste. DELTA "NOMAD P-70" is designed for quick change of 5-quart containers. 50-ft. air hose and 10-ft. grease hose standard equipment — longer hoses readily available.

If your maintenance problem includes lubricated plug valves, chances are you *need* a DELTA "NOMAD"—better investigate TODAY!

DELTA-DESCO

WRITE FOR CATALOG
The Only Complete Valve Lubrication Company

VALVE LUBRICANTS AND EQUIPMENT

Color Coded Lubricants • Hand Guns
Fittings • Air-Motor Volume Guns
Automatic Lubricators • Electronics

DELTA-DESCO COMPANIES
DELTA ENGINEERING SALES CO.
Box 1403 Shreveport, Louisiana
Branch Offices in All Principal Cities

conference on corrosion control, Extension Study Center, Norman, Okla.

9-11 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Biltmore Hotel, Oklahoma City.

13-18 American Chemical Society, national meeting, San Francisco.

15-17 University of Oklahoma, thirty-fourth annual gas measurement short course, North Campus, Norman, Okla.

16-18 Natural Gasoline Association of America, annual convention, Baker and Adolphus Hotels, Dallas.

16-18 National Petroleum Association, fifty-fifth semiannual meeting, Hotel Cleveland, Cleveland.

17-18 Texas Technological College, fifth annual West Texas oil lifting short course, Lubbock, Tex.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers Louisiana-Arkansas, East Texas, and Mississippi petroleum sections, gas technology symposium, Shreveport, La.

17-18 Geophysical Society of Tulsa, Tulsa Geological Society, annual midwestern exploration meeting, Tulsa.

20-23 American Institute of Chemical Engineers and Chemical Institute of Canada, chemical engineering division Canada-U.S. chemical engineering conference, Montreal.

21-23 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Cosmopolitan Hotel, Denver.

23-25 Second International Williston Basin Symposium, sponsored by Saskatchewan Geological Society and North Dakota Geological Society, Regina.

27-29 Independent Petroleum Association of America, midyear meeting, Hotel Sherman, Chicago.

27-30 American Association of Petroleum Geologists, Rocky Mountain section, Casper, Wyo.

28-29 University of Oklahoma, third annual conference on automatic control in the petroleum and chemical industries, Oklahoma Memorial Union Building, Norman, Okla.

28-30 Southern Gas Association, annual convention, Dallas.

29-May 1 Petroleum Industry Electrical Association, Petroleum Electric Supply Association, annual joint meeting, Adolphus Hotel, Dallas.

MAY

5-6 Society of Petroleum Engineers of A.I.M.E., North Texas section, secondary-recovery symposium, Wichita Falls, Tex.

5-7 Purdue University, thirteenth annual industrial waste conference, Purdue Memorial Union Building, Lafayette, Ind.

5-9 American Gas Association, distribution, production, and transmission conference, Roosevelt and Commodore Hotels, New York.

7-9 American Petroleum Institute, Division of Production, eastern district meeting, Deshler-Hilton Hotel, Columbus, Ohio.

8-9 Texas Petroleum Research Committee eleventh oil recovery conference, symposium on "A Century of Texas Oil 1875-1975," University of Texas, Austin.

12-14 Chemical Institute of Canada, National Research Council, eighth Canadian high polymer forum, Macdonald College, St. Anne de Bellevue, Quebec.

12-14 Instrument Society of America, symposium of analysis instrumentation division, Shamrock Hilton Hotel, Houston.

12-16 American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, Los Angeles.

20-22 Pennsylvania Gas Association, annual meeting, Pocono Manor Inn, Pocono Manor, Pa.

21-23 American Petroleum Institute, Division of Marketing, midyear meeting, Roosevelt Hotel, New Orleans.

22-23 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

26-28 Chemical Institute of Canada, annual conference and exhibition, Royal York Hotel, Toronto.

JUNE

8-11 American Petroleum Institute, Division of Transportation, annual tanker conference, Greenbrier Hotel, White Sulphur Springs, W. Va.

10-12 Appalachian Underground Corrosion Short Course, School of Mines, West Virginia University, Morgantown, W. Va.

19 Pennsylvania Grade Crude Oil Association, annual meeting, Penhills Club, Bradford, Pa.

23-25 Interstate Oil Compact Commission, midyear meeting, Hotel Utah, Salt Lake City.

22-28 American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, Boston.

28-July 2 Petroleum Equipment Suppliers Association, twenty-third annual meeting, Chateau Frontenac, Quebec.

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TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone Diamond 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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JOURNALLY SPEAKING

All Wrapped Up

WHAT DO YOU DO with the wrappers in which you receive our favorite oil publication?

Most readers, no doubt, ruthlessly tear them off and discard them in their well-justified haste to get at all the excellent, top-notch, super-duper editorial material enclosed therein.

But not Warren O. Carlson, of Chapman, Kans. He slides them off carefully and saves them for his little daughter. She finds the leathery-brown wrappers with their forest-green trim just what she needs as chaps to complete her cowgirl outfit.

The proud papa sent this picture along to demonstrate how the Journal serves the entire family. It was enough to make us break our rule against running pictures of pretty girls on this page.

But that's not the only thing that can be done with our wrappers.

For example, there's E. L. Dodge, an oil-well driller in Lincoln, Neb.

Every week Dodge carefully slips the wrapper off his copy of the Big Yellow Book and sets it aside in a safe place. Then as he reads the magazine he notes all the items he may want to refer to some time in the future.

Then he slips the wrapper in his typewriter and types out notations of all this useful information and the pages where they appear. Then he puts the magazine back in its wrapper and carries it up to his attic, where, he says, he has some 30 years of Journals neatly stacked away, each in its original wrapper but with his own personal table of contents typed on the outside.

Dodge says his wife used to raise cain with him for having all those yellow magazines lying around the house, but she doesn't give him any trouble as long as he keeps them in the attic. The wrappers keep the dust out of the magazines, and he says he never has any trouble finding an article in a back issue because of his wrapper-index system.

That's all right for Driller Dodge, but there's an easier way for most people.

Just write in to our Reader Service Department for a copy of our annual index. It's free for the asking. The 1957 index is ready now.

You didn't know we have an annual index? It's surprising how many people don't know it. We've been getting it out for years and years, and every January we print little "boxes" in the magazine announcing that it's available. Yet every once in a while some subscriber complains:

"Why don't you guys print an annual index so I can locate an article you printed a year or so ago?"

So we'll repeat—Yes, we do have an annual index. You can have one for the asking. And if you request, we'll put you on the permanent mailing list to get one every year without asking again. What more can we do?

Whether you save the wrappers for your own indexing system, make them into cowgirl chaps, or use them to line the bottom of the bird cage, our annual index will be a big help in locating an article in a back issue. It's a whole year's table of contents all wrapped up in one package.

—Henry D. Ralph.

there's something new in Packers!

Where there is a need... Baker shows the way. Recognizing a need for an economical, retrievable and yet dependable packer for water flooding and other pressuring applications in shallow or low fluid wells, Baker engineers have come up with the new Model "A" Tension Packer.

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For example, there's a "full bore" to permit the passage of instruments through and below the packer; a proven packing element that assures positive pack-off; and *rocker-type slip units* that eliminate cumbersome drag springs, slip tie-links, and guide grooves. For simplicity of operation, there's the reliable J-Slot setting and release mechanism.

Get to know the Model "A" better. There *is* something new in packers, and your Baker man has all the facts. Call him for information on how the Baker Model "A" Tension Packer can solve *your* hook-wall packer needs, or write for Bulletin No. 334.

PRODUCT NO. 739-A

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MODEL "A"
TENSION PACKER

Will red tape strangle NPC?

AN organization of great value to the oil industry and even greater value to the Government is about to be sacrificed on the altar of bureaucracy.

The National Petroleum Council threatens to disband if forced to comply with the arbitrary criteria that the Department of Justice wants to apply uniformly to all industry advisory committees. These would give NPC a government chairman and dictate its agenda, appointments, and assignments.

At first glance this may seem a truculent attitude. Why should oil insist on being different? If oil men are sufficiently patriotic to serve on an advisory committee, why shouldn't they do it the way the Government wants it done, even if the red tape is annoying?

The answer lies in analysis of how NPC operates, what the proposed rules imply, and oil's history of dealings with the federal Government.

OIL GOT BURNT ONCE. At the request of Interior Secretary Ickes it tried to stabilize the gasoline market and for this it was prosecuted for antitrust violations in the Madison case.

During the war, oil executives patriotically ran the risk of a second Madison case by serving on the Petroleum Industry War Council and doing whatever the Government asked. But they balked strenuously at continuing this risk in peacetime.

At the insistence of the Interior Department, NPC was set up 11 years ago under a specific charter and rules of operation. These include numerous safeguards against any possible entanglement in antitrust laws. For example, of 92 government requests for studies, NPC has rejected 11 as improper.

Ironically, the Justice Department's uniform rules incur greater risk of antitrust violation rather than less. A government chairman and a government agenda could unwittingly get the industry into trouble.

The NPC would have to dissolve, because its present charter is in direct conflict with the D. of J. rules. Most of the 104 top industry leaders now on NPC would not be interested in serving on the routine type of "captive" committee, even if the antitrust angle were not involved.

THE GOVERNMENT WILL LOSE the advice of the industry's most dynamic executives and the services of their companies in making statistical surveys and economic studies. NPC's reports, many made for defense planning, contain invaluable data which could not be obtained in any other way.

Industry will lose something, too. NPC is the one forum where representatives of all segments of the industry, large and small, have equal voice and equal vote. The exchange of views and the cooperative research have done as much to promote industry unity as to assist government planning.

But the industry will keep its liberty and its independence.

sure acceptance of contracted products throughout contract.

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the OIL AND GAS JOURNAL

January 20, 1958

Oil Fares Well in 1959 Federal Budget

Increased military expenditures will push 1959 spending $1.1 billion over the current year. Budgets in all other departments are being cut to make room for the higher military figures, but oil's cutback is small.

Bertram F. Linz
Washington District Editor

THE ADMINISTRATION laid its 1959 money plans before Congress last week.

It took a 1,024-page book to give the details. Boiled down, this is what it said:

... The Government will spend $73.9 billion in the year beginning July 1. That will be an increase of $1.1 billion over the current fiscal year.

... Receipts will be $74.4 billion—it hopes. That will be $2 billion more than it expects this year.

... A $500-million surplus will result—if costs of civilian government are kept down. There will be no tax reductions.

A year ago, President Eisenhower told Congress he hoped for a $1.8-billion surplus by this June 30. Sputnik and a business setback are changing that into a $400-million deficit.

Upturn in sight . . . But Eisenhower is confident that our economic expansion will soon be resumed, bringing higher receipts at present tax rates.

Defense spending, the natural appetites of consumers, and government policies justify this confidence, he told Congress in his budget message.

Budget estimates of receipts for the coming fiscal year include $1.71 billion from the gasoline tax, against $1.65 billion this year. Lubricating-oil taxes will bring in $76 million, a $1-million increase. Another $40 million will come from pipeline transportation, also a $1 million rise. The diesel-fuel tax will hit $55 million, up $8 million from this year.

Royalties on natural resources, mostly oil, will top $88.5 million, an increase of slightly less than $400,000. But this year's take is $60 million less than forecast a year ago, due to the halt in sales of outer Continental Shelf leases.

Spending eases . . . Interior's funds for oil activities will be some $945,000 less than this year.

But the bulk of the cut will be made by slowing down the U. S. Geological Survey's geologic and mineral resource surveys and mapping. Only $9,500,000 will be provided for this work, against $10,414,000 this year.

No cut, however, will be made in the $2,114,000 allowed this year for conservation of lands and minerals through supervision of government and Indian oil and mineral leases.

The same amount as this year, $199,600, will be allowed for enforcement of the Connally Hot Oil Act. But other funds for the Office of Oil and Gas will be cut $35,000. Most of the saving will be made by cutting the number of employes.

Bureau of Land Management funds for lease and disposal of lands and mineral resources will be cut $10,500 to $5,499,400. As a result, it is not expected to be able to dispose of all the cases expected to be filed.

The BLM will have 74,000 cases pending next July 1. It will receive 150,000 new and reactivated cases, against 140,000 this year. It will be able to dispose of only 145,000 of these.

The budget provides $2,399,000 for research on oil, natural gas, and oil shale by the Bureau of Mines, an increase of $12,000 over this year.

The bureau's special helium fund will be cut from $10,383,385 to $6,908,789 by a cut in capital outlay, which amounts this year to $9,460,770. Sales of helium during the coming fiscal year are expected to reach $7,368,400. There will be about $6,534,500 this year.

Fuel for the military services will cost more than $730 million. The Navy will be given $120.2 million for ship fuel, a cut of $373,000 from this year. The Air Force is to get $611 million, a cut of $9 million.

Funds for the naval petroleum reserves will be more than doubled over this year. The department is to get $1,683,000 against $825,000. The increased money will be used for drilling offset wells in Naval Petroleum Reserve No. 3 (Teapot Dome, Wyoming) to prevent drainage.

Cost of regulations . . . Federal Power Commission costs of natural-gas regulation will rise sharply next year, it is indicated.

The FPC is to be given $3,238,500 for this work, against $2,563,000 this year. The additional money will be needed to take care of the 7,600 rate filings expected to be received, against 6,900 this year. But in 1957 the FPC received 7,800 rate filings, and had only $2,379,300 for their handling.

Cost of enforcing antitrust laws also is increasing. The antitrust division of the Justice Department will need $3,798,666 next year, against $3,773,229 this fiscal year.

Eisenhower, in both his message and the budget itself, laid great stress on the need for expanding scientific education. To do this, the funds for the National Science Foundation will be increased by $100 million over this year's $40 million. The additional money will be used for grants and contracts supporting science and scientific manpower.

Offshore Leasing Riddle

. . . perplexes California officials. Their problem is this: Take high royalty bid or biggest cash bonus? Some guideposts emerge at a series of hearings.

CALIFORNIA doesn't know yet how it will lease its offshore lands, but it's leaning toward a cash-bonus basis.

This straw in the wind was sighted at two recent hearings in Los Angeles. A variety of opinions on how the offshore acreage should be leased was offered at both sessions. But bulk of testimony favored the cash bonus bidding policy.

The State Lands Commission, meanwhile, will have further guidance next month when it receives the final recommendations on the matter from two Tulsa oil consultants retained to make studies on a state tidelands policy.

The Tulsans, Herman H. Kaveler and J. M. Wanenmacher, appeared before a commission hearing January 13. This hearing followed by 3 days a similar session held by the tidelands subcommittee of the state assembly's interim committee on judiciary.

Some guideposts . . . Kaveler offered a series of general suggestions.

He said the commission should:

. . . Assemble an efficient and competent staff to keep a constant check on offshore operations.

. . . Exercise with diligence its discretionary power of rejecting any and all bids and to switch bid terms on parcels when one method proves better than another.

As to sizes and type of acreage offerings, Kaveler also suggested the commission should:

. . . Consider lands as being in one of three categories—wildcat, semiproven, or proven. Proven acreage would include acreage offsetting production or as being geologically located on a productive structure.

. . . Offer lands for lease only when requested.

. . . Lease acreage in small parcels to prevent leasing an entire field in one parcel.

As to lease terms, Kaveler recommended:

. . . Keeping present rule requiring the lessee to start operations within 3 years. But the term "start operations" should be interpreted to mean actually making hole, not just preparing sites, etc. No extensions on this restriction should be granted except under extraordinary circumstances.

. . . Setting an annual rental fee on all acreage due on the anniversary of the lease. This rental should never be waived, even if the start of operations period is extended.

. . . Making wildcat leases substantially less than the 5,760-acre maximum allowed per parcel under the law. They should be awarded on a cash-bonus basis with a sliding-scale royalty rate predetermined.

. . . Keeping semiproven leases smaller than the wildcat leases and also award them on a cash bonus bid basis.

. . . Making proven-land offerings smaller than semiproven parcels and with a higher rental fee. They should be awarded on a combined cash bonus-highest royalty bid basis.

Kaveler further recommended that the state make no allowances for dehydration. The state also should have the right to determine the selling price when taking its royalty as a part of the cash market of the oil produced.

Lawmakers convene . . . The legislative gathering heard two executives

1 Workman mixes ammonium nitrate fertilizer with oil in wash tub.

2 Mixture is poured into hole on top of a stick of dynamite.

3 Second dynamite stick is placed in top of hole, then tamped in.

4 Powder man lights fuse on Permacord connecting all shot holes.

Blasting With Fertilizer

THE TEXAS CITY fire disaster of 1947 taught industry that ammonium nitrate fertilizer will explode under high compression.

The French freighter, Grandcamp, provided the costly lesson. The vessel, carrying a supposedly harmless load of fertilizer, exploded during the Texas City catastrophe.

Knowledge gained from the incident has been put to beneficial use today by the pipeline industry. Powder men have found that ammonium nitrate is safe to handle, easy to con-

take opposite stands on lease policies.

Testimony was heard from Frank Hortig, executive officer of the lands commission, and R. W. Ragland, vice president of Richfield Oil Corp.

Hortig declared he "leaned" toward a policy of awarding leases with a cash bonus being the bidable factor. He said he felt such a technique would result in a greater financial gain to the state in the light of the high ratio of failures to successes for wildcatting in California. At least the state could pocket the cash bonus if the acreage failed to prove productive, Hortig said.

However, he didn't completely discount the high royalty bid technique. He said if a checkerboard policy of awarding leases is followed, then parcels offsetting proven parcels could be offered on a high royalty bid basis with the likelihood of maximum financial gain to the state.

Oil's position . . . Ragland said Richfield felt the highest royalty bid was the best method and would result in greatest gain to the state. He said the technique would:

. . . Eliminate the tendency of producers to keep down production rates in order to stay in lower royalty brackets under a sliding scale royalty lease.

. . . Provide a hedge against inflation since royalties are paid in oil or in cash at the current market price while "dollars paid as a cash bonus can become worth less and less, if, as, and when inflation progresses."

Ragland startled the meeting by declaring: "It is my belief that potential bidders know a great deal more about the value of these lands as prospective oil lands than does the staff of the State Lands Commission."

This statement was made in answer to arguments that high royalty bid factor in awarding leases would result in oil companies losing interest in the state's tidelands.

He proposed the state test that argument by conducting a test run on the center four parcels of the 10 involved in the 54,000-acre offering. The Richfield executive suggested two be put up on a cash bonus bid basis and two on a highest royalty bid basis. If the state found one better than the other, it could reject the objectionable bids and reoffer the parcels under the better technique.

5 The detonating wave travels through the Permacord at 20,350 ft. per second. Explosions in all holes are almost simultaneous.

6 Back hoe cleans out the loose rock. Trench is now ready for 16-in. line.

Helps Build a Pipeline in Rough Country

tro', and cheaper than other explosives.

Permian Basin Pipeline Co., a subsidiary of Northern Natural Gas Co., uses the ferilizer in blasting pipeline trenches where ditching machines won't do the job in rock country of West Texas. The company is laying 83 miles of 16-in. line from Eldorado, Tex., to Spraberry field.

The fertilizer, a natural-gas product, is manufactured in pellet form, mixed with oil, and poured into shot holes. Compression required to detonate the mixture is supplied by sticks of dynamite placed above and below it.

Workmen use an H-frame wagon to drill 4-ft. shot holes about 3 ft. apart and connect the dynamite sticks in the holes by Permacord, a detonating fuse.

How Gas Prices Vary

. . . is shown in $100,000 study of more than 2,000 gas contracts. Five factors influence cost, study indicates.

THE PRICE OF GAS sold by independent producers in the Gulf, Mid-Continent, and Rocky Mountain areas on long-term contracts runs from 3.57 to 21.4 cents per 1,000 cu. ft.

This range is shown in a digest of more than 2,000 contracts filed with the Federal Power Commission since January 1, 1953.

The review of the rates, charges, terms, and conditions in these contracts was prepared by the consulting firm of Foster Associates for submission to the FPC in omnibus rate hearings held this month.

The survey was made at the suggestion of the FPC staff. Nine producers whose rates are under fire footed the cost, estimated at over $100,000.

The omnibus hearings are an outgrowth of an investigation started in January 1955 into the rates of a group of producers selling to Tennessee Gas Transmission Co.

Involved in the case are Champlin Oil & Refining Co., Pan American Petroleum Corp., Continental Oil Co., Western Natural Gas Co., Atlantic Refining Co., Humble Oil & Refining Co., Sinclair Oil & Gas Co., Tidewater Oil Co., and C. V. Lyman of Midland, Tex.

The hearings were limited to three points, producing evidence which may be used in separate hearings on the rates of each producer. These covered the basic rate-schedule data; its analysis; and the offer of theories of rate fixing for sales by independent producers.

May affect controls . . . The data may be an important factor in the FPC's decision whether to adopt utility-type regulation of independent producers.

Even if a cost basis is not applied, it may have to be considered as a "point of departure" under the District of Columbia Appeals Court decision in the Panhandle case, which the Supreme Court refused to review (OGJ, Oct. 15, 1956, p. 87).

The detailed analysis of contracts traces the pricing history of the industry over the past 5 years. It is limited to long-term contracts, since 90 per cent of the producer-pipeline deals are for 20 years.

The purpose, it was explained by Dr. J. Rhoads Foster, head of the consulting firm, is to show that field price data, as reflected in competitively determined sales contracts, provides evidence of market price at the time the contracts were made.

Why prices vary . . . Five factors are the principle influences on the price of natural gas, Foster believes:

. . . Date of contract.

. . . Distance of gas supply from consumer markets.

. . . Volume of reserves committed.

. . . Term of contract.

. . . Quality of gas.

"The typical long-term contract does not fit a single price at which the gas is sold but establishes a bundle of definite and indefinite price provisions, the composite of which is the price consideration," he said.

Several concepts of market price were outlined by Foster. But he said average base prices under the most recent contracts are the best practical, readily available measure of the current market.

The average base price tends to understate the actual, current market price as manifested in the full terms of price bargain between buyer and seller, Foster explained.

But it provides a good approximation of the current level, he said. It should be used as the primary point of reference by the FPC in establishing current market price levels.

Acrolein Makes Its Bow

SOMETHING NEW in petrochemicals will result from a new project of Shell Chemical Corp. at Shell Oil's Norco, La. refinery.

Early this year work will begin on two new plants to make acrolein and glycerin.

Acrolein, an unsaturated aldehyde with three carbon atoms, is considered a comer by Shell. While its initial use at Norco will be to make 35 million pounds of glycerin per year, it is a highly reactive derivative of propane or propylene and shows promise of becoming a major building block.

Shell is hard at work on a variety of ways to use this new petrochemical intermediate. It will have some extra acrolein for sale when the plant is on stream.

The acrolein - hydrogen peroxide method that Shell will use to make glycerin is a new route to an end product that is today in ample supply. Shell is one of the principal sources of glycerin today.

The new Norco plant will permit Shell to cut back on glycerin production from allyl chloride and to switch the latter to the making of epichlorohydrin, epoxy resins, and alkylamines, according to R. C. McCurdy, Shell Chemical president. Shell just completed a hydrogen peroxide plant at Norco.

Octane Increased

by fuel injection in tests, but no big change is seen.

FUEL INJECTION will give the motorist some octane advantage. But it won't save any gasoline in terms of miles per gallon. These conclusions and others came from the latest evaluation of fuel injection vs. carburation in a modern V-8 automobile.

The report, presented before the Society of Automotive Engineers' annual meeting last week, contained little that was spectacular. It tended to bear out other findings that indicate that fuel injection offers some advantages, but won't bring about any revolution in car design or fuel make-up.

Dynamometer and vehicle tests were made by A. E. Felt, D. L. Lenane, and K. W. Thurston of Ethyl Corp.'s research and development department. They made a direct comparison by switching back and forth between a standard four-barrel carburetor and a timed manifold-port injection system.

A slight increase varying from zero to 3 per cent was registered in brake horsepower with fuel injection. This varied with engine speed and resulted from elimination of manifold heat.

An interesting factor on octane requirement proved to be the tetraethyl lead content. Using a primary reference fuel, they found octane requirements the same at maximum-power fuel-oil ratio at speeds above 1,600 r.p.m. But at lower r.p.m., around 800, the use of fuel injection lowered the octane requirement by 1.7 research numbers.

Their results were mixed with unleaded sensitive reference fuels. Fuel injection gave them a higher rating at 1,600 r.p.m. and lower at 3,200 r.p.m. But leaded commercial fuels rated higher at all engine speeds with fuel injection and the more TEL the better the improvement. This greater effectiveness of TEL is presumed to result from better distribution of the additive to each cylinder.

Gas Bill Under Fire

as Congress gets busy again; bill called dangerous, costly.

HARRIS BILL opponents lost no time in resuming their fight against the measure when Congress opened its 1958 session.

The attack was set off by Sen. Alexander Wiley of Wisconsin. The bill is "dangerous," he said in a long speech on the Senate floor, and would raise consumers' gas bills "$500 million a year."

Wiley urged consumer-state congressmen to vote against the bill, if and when it comes up.

"It is a bill which could do more to send prices skyrocketing than any single bill within the past 10 years," Wiley charged.

"Supporters of the bill have attempted to clothe it with enough legal gobbledygook to give the impression that it continues federal controls.

"The fact of the matter is that it emasculates all controls."

No deal with coal . . . Congressmen interested in the measure, meanwhile, denied reports that an agreement had been reached with coal interests to write new clauses into the bill to get coal-state support.

The coal industry is seeking to ban below-cost industrial sales of gas. The pipeline companies, so far, have refused to go along, holding that such a ban would adversely affect their summer transmission volume.

The bill, approved last year by the House commerce committee, is to be brought up in the House for vote next month if a poll shows that enough votes for passage can be rounded up.

But some congressmen assert that even if the support of the coal-state delegations is secured it will be impossible to enlist enough votes to get it through the House.

Washington Wildcat Planned

SUNSHINE MINING Co. is going back to rank wildcatting in its efforts to make Washington more than a 1-well oil state.

After failing to extend production around its Ocean City discovery with a northwest extension test, Sunshine has announced new plans. Its next try will be at Duck Lake, some 5 miles south of 1 Medina, the discovery well and Washington's only producer to date.

Sunshine plans to move in a rig by the middle of this week and start drilling on 1 Minard on the Olympia Peninsula in Grays Harbor County.

watching WASHINGTON

. . . with Bertram F. Linz

• Seaton delivers double punch at oil

OIL MEN are beginning to realize that Secretary Fred A. Seaton is writing new oil policies for the Interior Department.

They learned this the hard way this month. Seaton twice in one day landed blows to the body that hurt.

One punch may be a knockout for the National Petroleum Council. The other will take 4.4 million acres of land out of oil development.

Former Interior chiefs fought to keep the NPC intact as set up in 1946. They saw it chiefly as a top-flight reporting agency, making studies that saved the Government money. Oscar Chapman even carried the fight as far as the White House, where he beat the Justice Department.

Seaton takes a different view. He considers the NPC an advisory committee, subject to rules laid down by the Justice Department.

Former Secretary Douglas McKay opened the wildlife refuges to leasing. Congressional criticism moved him to delay action, but he never quite abandoned the plan. Seaton now officially has closed them again, and nailed the lid down.

• A showdown at last on gas rates

THE FPC appears to be in a spot now where finally it will have to decide this question: Whether to apply utility-type rules to independent producers or give them a fair price based on market competition for the gas they sell.

The test is being set up in the nine-company omnibus hearings now going on before an FPC examiner.

The producers aim to show that their prices can't be fixed in the same way and on the same basis as the rates of pipelines and other utilities.

The theme they are pressing is that cost-plus rate regulation would result in costs, and ultimately in prices, higher than market prices.

A 1955 decision on how the FPC should set prices for gas produced by Panhandle Eastern Pipe Line Co. is a factor in the case.

The Supreme Court affirmed a decision that fair field price can't be used alone in fixing the value of gas produced by Panhandle. Cost must also be determined, if for no more than a starting point, it was ruled.

The producers, however, point out that the decision applied directly to gas produced by a pipeline. It does not, in itself, mean that the principle must be applied to independent producers as well, they claim.

• Look for a hot trade act fight

COAL INTERESTS will make a new pitch for curbs on residual imports when Congress takes up extension of the Reciprocal Trade Act.

More than a half-dozen bills to impose quotas on heavy fuel oil were offered last session. More were added when Congress met again this month.

The administration will not support a move to single out residual alone for formal controls. But if the voluntary import program fails, formal controls on crude are seen in Washington as inevitable.

Any move to write crude-imports control into law could well include heavy fuel, and possibly products generally.

There are no signs that the crude program will not be a success. But many producers believe it should be backed up by statute. The last word on the issue will lie not with the White House but with Congress, which will write the measure.

So, when the House ways and means committee takes up the foreign trade law, coal and labor interests and their congressmen will be in there fighting for a way to regain lost coal markets.

Whether oil producers will team up with them remains to be seen.

A FOREMAN for Service Pipe Line Co. talks to patrol plane. It's just one way . . .

Oil's Use of Radio Is Growing Fast

. . . But problems are growing, too. Common carriers are moving into the picture, and FCC is considering new regulations for the industry.

John P. O'Donnell
District Editor

THE OIL INDUSTRY is the biggest industrial user of radio and, as such, has a major stake in the Federal Communications Commission's plans for future regulation.

When Petroleum Radio Service was authorized in 1949, some 230 oil companies qualified for its use. Today the number has jumped to 984 companies. The number of radio units in oil service has risen even more sharply—from 5,000 to 43,723.

In 10 years the growth should be another 250 to 400 per cent.

Currently the emphasis is on microwave. And this, coupled with the rising demand for lower frequencies, means the oil industry must battle to maintain its share of frequencies.

Three major problems have developed with the rise of industrial radio:

. . . Microwave regulation. Use of higher frequencies has grown to the point where the FCC believes tighter regulation may be required. Oil's problem: To make sure its needs are satisfied.

. . . Common-carrier encroachment. Common carriers believe they can, and should, supply practically all the radio needs of industry. Oil's problem: To retain control over its own systems.

. . . Reallocation of frequencies. FCC is considering changes to reduce congestion and provide additional service in the commonly used lower frequencies. Oil's problem: To hold what it has and be assured it can expand.

For some companies the correct solution to these problems is critical insofar as field operations are concerned. And the key agency that will supply the solution is the FCC.

The microwave issue . . . For years FCC has encouraged use of microwave systems, which operate on frequencies above 890 megacycles. But now their use has grown so much that the commission believes it should decide specifically who uses what frequency.

Oil was one of the first industries to go in for microwave, and it has invested millions in systems and equipment. It must now protect the investment and look ahead to needed expansion.

Here are the microwave statistics for oil companies: 24 users with 444 stations in 1954; 39 users with 730 stations in 1957; and at least 91 users with 2,250 to 3,360 stations estimated for 1967.

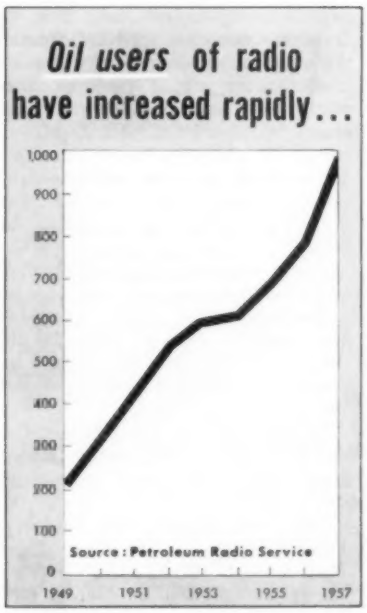
FCC recently completed a series of hearings on microwave communications but is not expected to decide what course to follow for several months.

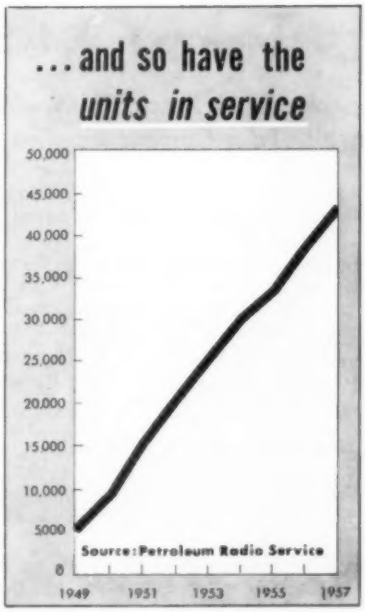
During the hearings the oil industry described the importance of microwave in oil. With microwave, for example, pipeline operators can communicate with pump stations on a main line and, through interconnections with VHF stations, talk with mobile units engaged in field work. Operators can dispatch movements of petroleum and can start, stop, and monitor remote pumps and motors. They can locate line breaks and notify repair crews. And they can talk to gathering-line operators.

"Many channels are required by petroleum pipelines, and they cannot be shared with another," William H. Morris of Sinclair Oil Corp. told FCC.

Microwave also is a great money and time saver for producers, particularly those operating offshore, or in swamplands, mountains and other remote areas, where wire lines are not feasible. It eliminates trips between the base of operations and producing wells, coordinates operations, and handles emergencies.

Morris said the petroleum industry is studying new ways to use micro-





wave, such as transmitting field data to central offices continuously and linking refineries so that their operations can be coordinated to meet market conditions more rapidly. Many marketing centers could be tied to a single refinery with microwave.

Pro and con . . . To counter the argument that common carriers can supply the needs of the industry, H. A. Rhodes of Transcontinental Gas Pipe Line Corp., told FCC that oil's requirements are "specialized and constantly changing."

"Common carrier engineering has not been trained to meet these specialized needs and is entirely too slow to cope with our requirements," Rhodes said.

Oil's private systems serve primarily remote and inaccessible areas where it would be unprofitable for common carriers to operate, he said.

These views are not shared by the common carriers, although the opposition is not unyielding. A witness for American Telephone & Telegraph Co. testified: "We are convinced that common carriers can meet most of the requirements of these organizations. Nevertheless we have not in the past and do not oppose the allocation of frequencies to them (right-of-way companies, including pipelines) where these frequencies are used primarily to meet special operational requirements."

AT&T's willingness to let pipeline companies use microwave for "special operational" purposes is nothing but a sop, according to one oil spokesman.

The common carrier . . . The principal common carriers—AT&T, United States Independent Telephone Association, and Western Union—have long opposed private use of radio frequencies.

They protested when Petroleum Radio Service was created in 1949 and have not been silent since. Latest evidence of their attitude on the subject in general was their testimony at the microwave hearings.

A cardinal issue involving common carriers and the oil industry is the "lease and maintenance" type of contract, under which the carrier leases radio equipment to a user and then maintains it. The oil company uses its own assigned frequency for the operation.

The Central Committee on Radio Facilities, organized by the American Petroleum Institute, opposes the "lease and maintenance" contract on the theory that it represents the first step toward complete control of radio communications by common carriers.

The committee's view is shared by the Department of Justice. In January, 1956, Justice entered a consent decree with AT&T under which such contracts are prohibited. The decree describes them as a threat to private enterprise that could create a communications monopoly.

But this did not end the matter. This year, AT&T published a tariff covering such "lease and maintenance" services, and FCC scheduled hearings. Once again Justice stepped in and told FCC it should reject the tariff. The result: Hearings were postponed indefinitely, and the device may never be revived again.

Common carriers contend, however, that they should provide radio service generally for private industry on the theory that (1) they can meet the needs of industrial users and (2) they are being deprived of revenue.

The oil industry's reply to the first argument was simply that applications have been made to common carriers for service but were rejected because the carrier lacked facilities.

To the second argument, Transcontinental's Rhodes said the oil industry paid far more to common carriers for regular communications services than it spends on its private communications facilities.

For example, Rhodes said, 48 oil companies which own most of the private communications networks in the country paid common carriers $35.7 million annually for communications but spent $13.2 million on their own facilities.

Actually, Rhodes said, when the oil industry supplies its own services to remote and inaccessible areas, the common carriers avoid losses.

Reallocating frequencies . . . FCC currently is reviewing frequency allocations between 25 and 890 megacycles for the first time since 1944. It completed the job of gathering data in November but will take considerable time deciding on the reallocation.

What FCC does could affect seriously Petroleum Radio Service. One big worry is that the agency might transfer some users to other bands. If, for example, allocations in the 25-50 megacycle band were withdrawn, it would make present equipment obsolete, require redesigning of systems, and increase the number of stations. This, in turn, would require more frequencies.

The API's Central Committee also is worried about expansion needs of the industry. Present oil company users expect to increase the size of their radio systems 50 to 70 per cent in the next 10 years. If they increase stations at the same rate as in the past, they will add 64,000 to 80,000 stations by 1967.

New users will create even more demand. If the present rate of growth in the number of users continues, the total could double in 10 years. Since today's users average 45 stations, the increase in new users would mean another 40,000 to 45,000 units.

Adding all factors, the Central Committee foresees a possible gain in Petroleum Radio Service use of 2½ to 4 times that of today.

California Cuts Take

. . . of crude as stocks rise sharply. New Mexico also will be affected because of tie-in with Four Corners pipeline.

CALIFORNIA companies are cutting their crude production because stocks have soared to new postwar levels.

The development comes at a time when the new Four Corners pipeline is preparing to go into operation and pour additional thousands of barrels daily into the West Coast market.

Import restrictions imposed under the Government's voluntary import control program apparently have not stemmed the tide toward reduced production.

Despite the trend, there were still no open signs of a break in the price of crude in California.

Here are the developments:

. . . **Standard Oil Co. of California,** Western Operations, Inc., cut 10,000 bbl. daily of fee-owned crude production. The cut will be spread over several areas, mostly in San Joaquin Valley and southern California.

. . . **A month ago** Union Oil Co. cut production 5,000 bbl. daily, and Richfield Oil Corp. cut 3,500 bbl. General Petroleum expects to cut by 2,500 bbl. soon.

. . . **At Santa Fe, N. M.,** a Union Oil spokesman said the West Coast has an oversupply of crude, and market prospects for San Juan basin oil moving through the new Four Corners pipeline are "not too bright at present."

. . . **Stocks in California** have risen to 143 million barrels, an increase of 38 million over a year ago.

Effect of the production cuts will put California's total at around 915,000 bbl. daily. Rumored cuts at other companies would put the total around 900,000-905,000 bbl.

What's behind it . . . California Standard said a decline in demand is responsible for the heavy increase in stocks. The demand is down for domestic, overseas, and military users.

The company also blamed limited storage for making it impossible to take more crude.

As it is, stocks are still piling up. In December they were increasing at the rate of 60,000 bbl. daily.

Of the 143 million barrels in storage on January 1, crude accounted for 41.5 million, an increase of 10 million over a year ago.

Stocks now are at their highest level since April 1941, when they topped 144 million. The storage situation has become so critical that some majors have reactivated old 1 and 2 million-barrel underground tanks that haven't been used for years.

Thus far, no crude price cuts have occurred, despite the heavy stocks. One major California company executive complained recently that California crude prices are 50 to 75 cents too high. But he said his company has no plan to change its postings.

New Mexico tie-in . . . The oversupply of crude in California is having a direct effect on deliberations of the New Mexico Oil Conservation Commission at Santa Fe.

The commission prepared last week to fix production allowables for the New Mexico portion of the Four Corners area. What it learned at a public hearing was discouraging.

Charles Parker, vice president of Union Oil, and other West Coast officials appeared at the commission's invitation to report on marketing prospects for the Four Corners pipeline, a factor which will figure heavily in future allowables for the San Juan basin.

Parker said he expects West Coast demand to drop 2 per cent in the first 6 months of 1958, compared with the same period last year. Demand fell 5 per cent during the last part of 1957, compared with the same period of 1956.

J. G. Coates of Gulf Oil Corp. agreed with Parker that "the demand situation doesn't look overly promising."

New Mexico's battle for a share of the Four Corners pipeline business is further complicated by differences in conservation practices of New Mexico and Utah.

Jack Campbell, attorney for the Independent Producers and Royalty Owners Association of New Mexico, protested to the commission that Utah producers are getting the lion's share of the Four Corners pipeline fill purchases because Utah lacks regulatory laws.

Campbell urged the commission to ask the Interstate Oil Compact Commission to call a hearing to air the issue.

The commission took no immediate action at last week's hearing on the northwestern New Mexico allowable. The allowable was cut from 28 bbl. daily to 11 bbl. daily for January because of a virtual shutoff in buying fill for the pipeline.

El Paso Natural Gas Products Co., which operates a refinery in the San Juan basin area, asked an increase to 13 bbl.

Pipeline status . . . The flood of new Four Corners oil into the California market actually will be delayed for a number of weeks—and this will further delay any sizable increase in the northwestern New Mexico allowable.

The reason is this: The Four Corners pipeline will not be ready for full operation in mid-February as planned earlier. A construction lag due to bad weather and rough terrain has forced a postponement. It now looks as if it will be April 1 before the line is ready.

Four Corners Pipe Line Co. has not stated what its initial take will be, but it is estimated at around 42,000 bbl. daily, far less than capacity.

Southeastern New Mexico . . . Meanwhile, the New Mexico commission rejected a recommendation of its engineer, Dan Nutter, to increase the allowable for southeastern New Mexico fields.

The commission ordered the 37-bbl. figure retained for February. This will result in a production decrease of about 700 bbl. daily because of fewer completions and reduced production in old fields.

Nutter recommended the increase because completions are down. He said the action of Gulf and Magnolia Petroleum Corp. in resuming purchase of full allowables was not a factor in his recommendation.

Next Week:

The Annual Issue

THE OIL AND GAS JOURNAL presents its Annual Issue next week reviewing the industry's performance during 1957 and forecasting developments for 1958.

A wealth of both general and statistical material is contained in the magazine. Over the years the Annual Issue of the Journal has become "must" reading in the industry.

Operating Firm Created

CENTRAL COMMERCIAL Co., Chicago, has formed a subsidiary, Central Commercial Oil Co., to take over operations of its oil and gas division.

Officials of the parent company will head the new firm. They are

Forest R. Lowrey, chairman of the board; C. H. Michael, president; S. E. Nielsen, vice president; and W. N. Guth, secretary. Lawrence J. Zoller, formerly manager of the oil and gas division, has been named vice president of the new company. Directors are Michael, Nielson, Zoller, and D. L. Neil.

A subsidiary carried on oil activities of Central Commercial until 1937, when it was dissolved and operations placed under the oil and gas division.

Central Commercial has oil interests in Oklahoma, Kansas, Texas, and Louisiana.

Foreign Buying Hit

again as IRAA objects to product purchases abroad.

DOMESTIC REFINERS filed a last-minute objection last week to the purchase of military jet fuel from Caribbean sources.

The Independent Refiners Association of America asked Commerce Secretary Sinclair Weeks, chairman of the cabinet crude-oil committee, to bring military buying into line with the import program.

Use of an exemption from the Buy American law to permit the purchase of products abroad has been under fire since last summer.

The IRAA asked the Defense Department to revise its plans to allow Caribbean products to be offered in the big semiannual jet-fuel bid opening this month.

Earl B. Smith, director for transportation, communications and petroleum policy, voiced the Defense Department's agreement that the basic purpose of the Buy American Act is to give preference to domestic suppliers.

But Smith explained that national security requires buying some oil from friendly foreign sources in order to make certain these sources will be available in an emergency.

Plans for the jet-fuel bidding, Smith said, could not be changed because of limited time. The whole subject is being reviewed, he told the IRAA, and any changes decided upon will be applied to subsequent purchases.

The purchase of products abroad, the IRAA told Weeks, means a diversion of foreign crude from domestic to foreign refineries and "has the same effect, as we see it, upon the American petroleum producer, refiner, consumer, and worker as would the continued high direct importation of the crude oil itself."

Big Year in Pipelining

. . . forecast by president of contractors' association. But this assumes a number of favorable government decisions.

CONTRACTORS last year laid the equivalent of a complete pipeline around the world, and another big year is in prospect if several big "if's" are solved.

This picture of construction activity was outlined by James P. Neill, managing partner of J. P. Neill & Co., Dallas, and president of the Pipe Line Contractors Association, at the pipeliners' convention which opened yesterday in Boca Raton, Fla.

Neill, in his presidential address, listed these "if's" facing the industry:

"If court decisions are clarified; if the Federal Power Commission grants certain certificates; if the Royal commission of Canada favors gas exports to the U. S.; if petroleum imports are curtailed; and if the money market does not dry up, we could have the biggest construction year in the history of pipelining."

He expressed confidence that these problems will be overcome.

Welders' shortage . . . Welding costs and the shortage of welders were discussed by Neill.

Assuming an average diameter of 18-in. and average length of a pipe joint at 40 ft., there would be 132 joints to the mile. In last year's construction, pipeliners made the equivalent of 3,354,000 18-in. welds. Neill figured the average cost of each 18-in. weld to be at least $8, making the welding cost to the industry $27 million. This does not include the intangible costs added to pipeline construction when welding became a bottleneck.

There is no way to estimate the costs due to shortage of welders, slowdowns or strikes, Neill said, but this sum is a sizable one affecting everyone in the industry and adding greatly to the contractor's overhead. Several contractors estimated conservatively that the shortage doubled their welding costs.

With this situation, the association's welding school to increase the supply of welders takes on added importance in the drive to hold construction costs in line. Cost of the new school to the association is about 0.025 per cent of the total cost of last year's welding.

Labor problems . . . Contractors must continue their efforts to hold down construction costs if they are to survive, Neill said.

"We are not in the positions of some phases of the heavy construction industry who secure their work from governmental sources such as military installations, highways, or public buildings," he said.

"I say this because it appears that some groups of contractors doing this type of work have granted wholesale wage increases and fringe benefits to the many trade unions with what appears to us almost reckless abandon, secure in the knowledge that these grants will come out of the public funds. We are then forced to meet these terms in our negotiations with the same unions."

He warned of the danger of contractors pricing themselves out of work. "Our good friends in the natural-gas pipeline companies already faced with almost insurmountable problems in order to gain rate increases now find themselves faced with even greater problems posed by the Memphis decision. At the same time our good customers in the petroleum industry are faced with worldwide overproduction causing some downward price adjustments.

"The unions will no doubt continue to press for increases. We are in a good position to be whipsawed between these two forces, and find that we have more and more difficulty in meeting increased costs. It behooves all of us to continue our efforts to check the continuing spiral of increased costs by working together through our Pipe Line Contractors Association towards a more efficient industry."

Little Inch Approval Near

A LAST-MINUTE OBJECTION could cause trouble, but if none develops, Texas Eastern Transmission Corp. should receive approval this week to convert the Little Inch line from gas to products.

The Federal Power Commission has before it an examiner's report approving the switch, with the conditions proposed by barge operators last month.

To speed up final action on the case, which has been under fire since July 1954, the FPC cut from 20 to 10 days the period in which objections may be filed.

Fee Dispute in UOP Sale Continues

IF THE NEW YORK attorney general has his way, Guaranty Trust probably will get "substantially less" than one-fourth of the $5,000,000 it asks as a commission on the sale of Universal Oil Products Co. stock.

The attorney general's position was reiterated in a brief filed subsequent to referee's hearings on the matter of Guaranty's fee.

Guaranty seeks a 10 per cent commission on the sale of the UOP stock, which it has held as trustee since a half dozen oil companies donated their holdings in the company to finance the petroleum research fund.

The value of the stock is estimated at $50,000,000, which would make Guaranty's fee some $5,000,000. This would be over and above the $650,000, at the rate of $50,000 per year, it has received for serving as trustee.

P. Hodges Combier, assistant attorney general, contends that the $650,000 has repaid Guaranty for the management services it has provided UOP since 1944. He says Guaranty took on the job at the $50,000 per year fee whereas another trust company offered to do it for $70,000 to $75,000.

Therefore, he continued, the bank's request for a 10 per cent fee on the proposed stock sale is "grossly excessive and unreasonable." Instead, he said, it should be substantially less than the fee paid to the investment syndicate. Syndicate fees usually run around 2½ per cent.

Combier said that "all the requested and probable commissions and fees of the Guaranty Trust Co., the investment bankers, the attorneys, etc., may aggregate approximately 17 per cent" or about $8,000,000. The attorney general, he says, is vigorously opposing the 10 per cent commission to prevent "an unwarranted invasion of the funds of this trust" and to conserve the maximum amount for "the charitable uses to which these funds are dedicated."

January 4 was the last day for filing statements before Referee Loeb. He will make his recommendation to Supreme Court Justice Markowitz, who will make the final decision.

. . . But Profits Still Aid Research

WHILE LAWYERS and financiers debate the fate of Universal Oil Products Co., what is happening to the petroleum research fund, the chief beneficiary of UOP profits?

The fund is still very much in business.

Its directors expect this business of financing research in the petroleum field will even pick up in the future.

The fund's advisory board, for example, will meet in Dallas late this month. At that time it will consider its 300th application for money to help advance scientific education or support a research project.

This work has been going on steadily since 1953. The fund has approved 233 grants to 115 different projects during that time. The approved grants total $1,369,736.

Even more funds will be available in the next 3 years. For instance 1958's basic budget will be about $765,000. Unexpended funds carried over from 1957 will boost this to $900,000. The fund also is expected to pick up an extra $200,000 from increased revenue from its trust, making more than a million dollars available in the annual budget.

One purpose of the sale of UOP stock is to increase and stabilize the fund's income.

DR. CARY R. WAGNER pushes research funds into new areas.

The projects . . . Size of the grants made from the fund gives a clue to the variety of work receiving support.

The grants range from $604 for a study of the inhibition of Kolbe electrolytic reactions to $50,410 for a still incomplete investigation into porphyrins in petroleum.

Much of the research has been devoted to conversion studies, relating to reaction mechanisms of petroleum constituents. These included studies directed particularly to catalysis and also basic research in kinetics and dynamics. Many of the original projects could be classified in this broad category. About $350,000, or 70 per cent, of the first 3 years' expenditures were channeled into such studies.

Basic studies of properties, structure, spectra, and other characteristics of hydrocarbons and other components of petroleum have taken most of

the balance. Some work also was done on the synthesis and properties of pure hydrocarbons.

Scope of the program, however, is undergoing a change. It is being broadened.

The change is taking place like this:

Proportion of 1957-58 funds allotted for broad conversion studies was reduced. Number of basic studies of petroleum components held at about the same. But 15 per cent of the grants went into fields previously not emphasized.

These new areas included an investigation of petroleum-research methods and techniques, and studies of radiochemistry and isotopes relating to petroleum.

Who gets the money? . . . The board also is stepping up its grants to college undergraduates for fundamental research, to outstanding scientists so they can continue projects already started, to help international exchange of scientists and students, and to give undergraduate teachers advanced study.

Purpose is to encourage scientific study at schools unable to promote such work, upgrade science teaching, encourage spread of any new scientific ideas from abroad.

The projects have been divided among 76 colleges and universities throughout the country.

Some grants have been made to schools with enrollments of fewer than 700 students. These schools are located in most of the 48 states and several foreign countries. These include Canada, Australia, Scotland, Ireland, Great Britain, and India.

Men behind the fund . . . Chairman of the fund's advisory board and one of the ramrods of the program is Dr. Cary R. Wagner, a veteran petroleum scientist.

Dr. Wagner is a man on the move. His home is 360-acre South Lane Farm in Utica, Ohio. But he usually spends 2 or 3 days each week in Washington at his desk in the American Chemical Society building. He also may be found frequently at Bartlesville, Okla., where he is a scientific consultant to Phillips Petroleum Co.

Dr. Wagner has been a teacher, oil-company chemist, and an industrial executive.

After graduation in 1915 from the College of Wooster, Wagner was a graduate assistant at Purdue. Following a short stint with the Bureau of Soils in Washington, he returned to Wooster as a chemistry instructor.

Dr. Wagner started his oil-industry carer with Standard Oil Co. (Ind.) at Wood River. In 1923 he left to become manager of Lion Oil Refining Co.'s plant at El Dorado, Ark., and a year later went to Pure Oil Co. He rose from assistant chief chemist to chairman of the company's refinery-control board.

During his stay with Pure, Dr. Wagner participated in developing the vapor-phase cracking and polymerization processes from pilot-plant stage to commercial-size operation.

Dr. Wagner's other activities have included work with Petroleum Administration for War, helping organize the ACS Division of Petroleum Chemistry, and serving as vice president of operations for General Aniline & Film Corp. from 1947 to 1952.

The busy sicentist returned to his Ohio farm only because his doctor advised him to take life easier. That's when he took up private consultation work and the research fund job.

Working with Dr. Wagner on the research fund board are Paul D. Bartlett, Harvard University; M. R. Ernsberger, Du Pont Co.; W. A. Gruse, Mellon Institute of Industrial Research; Wheeler G. Lovell, Ethyl Corp.; A. L. Lyman, California Research Corp.; J. K. Roberts, Standard Oil Co. (Ind.); Frederick D. Rossini, Carnegie Institute of Technology; Robert W. Schiessler, Socony Mobil Oil Co.; Harold M. Smith, U. S. Bureau of Mines, Bartlesville; John E. Sherborne, Union Oil Co.; Charles L. Thomas, Sun Oil Co.; and Calvin Vander Werf, University of Kansas.

Importing Ranks Growing

. . . with rush of 18 companies filing for permits. If all requests are granted, volume may swamp control plan.

SERIOUS THREAT to the voluntary import control program is arising from plans of 18 gulf and East Coast companies to import foreign oil.

Capt. M. V. Carson, Jr., administrator of the voluntary program, revealed the new import plans have been filed under 6-month notices of intent.

He has not disclosed volume of oil involved.

The total, however, is reported to be sufficient to jeopardize the control plan if all requests are granted.

The new requests will be reviewed next month by Carson. Two series of hearings will be held February 10-14 and 17-20 when the companies will present their claims.

New look at program . . . The rush to join the ranks of importers may have definite bearing on the review which the cabinet committee is expected to make some weeks hence.

The present allocations run only until next June 30, as do those recently provided for West Coast importers.

The cabinet committee is expected to survey domestic production, demand, and the importers plans before writing a program for the last half of the year. Its task will be made more difficult if newcomers continue to enter the field.

No maximum allowance for new importers is provided in last July's report of the cabinet committee.

But the committee said at that time that newcomers should have the opportunity to enter and share "in a reasonable manner" in the U. S. market.

How it works . . . A general rule for handling these requests was laid down by the committee.

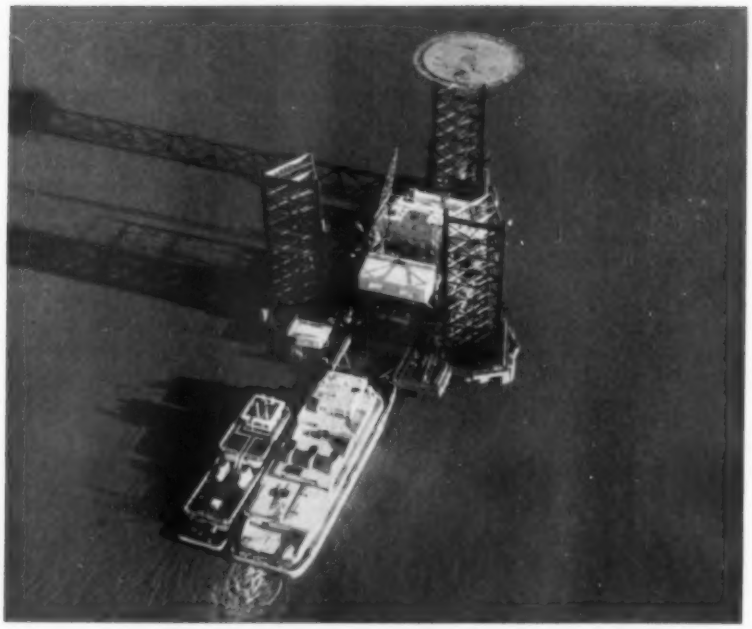
"A determination should be made as to the extent these importers should share in the market initially, and as to whether room can be made for them as a result of the increase in permissible imports arising out of the increase in domestic demand or whether it will be necessary for older importers to decrease their imports in order to make room for the new companies," it was held.

That is the problem confronting Carson next month as the 18 companies present their cases.

The companies seeking to import are:

Chemoil Corp., New Orleans; Clark Oil & Refining Co., Milwaukee; Falcon Petroleum, Houston; Frontier Refining Co., Denver; International Oil Corp., Cambridge, Mass.; Jenney Manufacturing Co., Boston; Pure Oil Co., Chicago; New England Petroleum Corp., New York.

Republic Oil Refining Co., Pittsburgh; San Jacinto Petroleum Corp., New York; Southeastern Refineries, Inc., Augusta, Ga.; Southland Co., Dallas; Superior Oil Co., Los Angeles; Tennessee Gas Transmission Co. and Bay Petroleum Corp., Houston (joint application); Texas City Refining, Inc., Texas City, Tex.; United Refining Co., Warren, Pa.; and Central American Oil & Mining Co., Dallas.



"JULIE ANN" has a New Orleans debut, while other . . .

LeTourneau Rigs Go Abroad

TWO LeTourneau-built mobile platforms for offshore drilling are ready for foreign duty, and a third will go to work in the Gulf of Mexico.

The new "Julie Ann" was christened at New Orleans' Bienville Street Wharf last week by its owner, Dixilyn Drilling Corp. The platform has 175-ft. legs, longest ever built by R. G. LeTourneau, Inc., and can be used in water up to 100 ft. in depth.

The rig is expected to start drilling in the Gulf of Mexico late this month.

A second LeTourneau platform began a 10,000-mile voyage this week to the Persian Gulf, where it will join the offshore fleet of Arabian American Oil Co. for drilling off Saudi Arabia.

The Aramco unit is a "miniature" type that sold for $750,000.

In a third development involving LeTourneau platforms, Barnwell Offshore Co. disclosed it may move its "Mister Cap" from the Gulf of Mexico to the coast of Honduras next summer.

Barnwell is considering the shift because it can transport the platform to the offshore drill site at less cost than transporting a conventional land rig 15 miles into the Honduras interior for onshore drilling. Barnwell owns a half interest in 51 million acres of Honduras land, including offshore.

Company President R. S. Barnwell said that, because "Mister Cap" is self-contained and can move swiftly to location, offshore drilling is more economical.

Two other LeTourneau-built offshore rigs, the "Scorpion" and the "Vinegarroon," are operating on the Gulf Coast. Another is nearing completion at Vicksburg, Miss., and will be delivered within 60 days to Reading & Bates Offshore Drilling Co., Tulsa.

Florida Line Nearer

as appellate court upholds FPC permit for gas project.

THE TEXAS-FLORIDA gas pipeline last week got the endorsement of the District of Columbia Appeals Court.

By an 8-to-1 vote the full court refused to review a 2-to-1 decision of a three-judge division of the court. The division had confirmed a Federal Power Commission order permitting Houston Texas Gas & Oil Corp. and Coastal Transmission Corp. to build the $150 million line to supply gas to Florida communities.

Whether the case will be appealed to the Supreme Court was not immediately disclosed.

The line is being fought by the Florida Economic Advisory Council. This is composed of some 200 fuel oil firms and individuals.

Industry briefs

Texas producers will get a substantial allowable boost in February—but face the possibility of pipeline proration by Humble Oil & Refining Co.

The Texas Railroad Commission has set the February allowable at 3,057,936 bbl. daily, up 50,088 bbl. daily from January 4. The commission adopted an 11-day producing schedule after 4 months on a 12-day pattern. Increased output will result in February having three fewer calendar days than January.

Charles Shaver, Humble representative, said the company may have to prorate on 11 days. He said Humble would have to sell an added 1,000,000 bbl. of oil to bring the situation into balance.

"Humble has always felt that purchaser proration should be used only as a last resort. However, the company in the end may be forced to conform to whatever the physical conditions require," he said.

Ohio Oil Co. has contracted for construction of two wings on its Research Center building at Littleton, Colo. When completed, the building will have 70,000 sq. ft. Working space for the scientific research staff will be increased from 14,900 sq. ft. to 35,100. Construction will require about 1 year.

Cities Service Oil Co. has purchased virtually full interest in 38 wells producing about 570 bbl. of oil daily in the Welch pool of Dawson County, West Texas. The company acquired full interest in 16 leases with 34 wells and a three-fourths interest in one lease with four wells. The sellers were Western Drilling Co., 13 leases, and Tobe Foster, four leases.

The wells produce from the San Andres formation at about 4,800 ft. Cities Service has taken the lead in a move to unitize the entire Welch pool of 12,000 productive acres. It has a pilot water flood now operating.

Western Offshore & Exploration Co., a subsidiary of Haney & Williams Drilling Co., has been awarded the drilling contract on the drilling platform Standard Oil Co. of California is constructing on its 5,500-acre offshore lease at Summerland, Santa Barbara County. The two-rig platform will operate on an all electric basis with power supplied by cable from shore.

Heritage Petroleum Corp., Dallas, has bought 28 producing wells in Payne, Pawnee, and Creek counties, Oklahoma, from Glenn Gillespie &

Sons of Cushing, Okla. Price was not disclosed. The wells produce from the Red Fork, Skinner, and Mississippian formations.

The Texas School Land Board has earmarked more than 250,000 acres for a March 4 lease auction. The board will offer leases on 460 tracts totaling 250,986 acres plus nine other blocks of state prison-farm land. The acreage will include 34,000 acres of tidelands in the area between the 3-mile and 3-league lines. The sale represents a change of heart on the part of leasing officials. Late last year a sale of Texas leases was cancelled because of what officials termed the present adverse state of the domestic oil business.

Gov. Price Daniel of Texas has asked that the state make a study of current leasing agreements between oil operators and private land owners in the area west of the Pecos River where much of the state land lies. The suggestion was made on the suspicion of several officials that state lease terms, calling for a minimum rental of $3 an acre, bonus bids, and one-sixth royalty, might be too steep.

American Metal Climax, Inc., has consolidated all its oil activities under a new subsidiary called American Climax Petroleum Corp. This includes more than 3,300 bbl. of oil production daily, formerly owned by Climax Molybdenum Co., American Metal Co., Ltd., Cobre Oil, Inc., and Blackwell Zinc Co., Inc.

The parent company was formed recently as result of the merger of Climax Molybdenum and American Metal. President of the new oil subsidiary is Gay V. Land, vice president of the parent firm. The new subsidiary will headquarter in New York, with division offices in Tulsa and Denver.

A special production allowable of 600 bbl. per day has been approved for the LPG pilot flood in New Mexico's Bisti field. The special allowable will help speed up evaluation of the pilot project which involves four wells in a 160-acre pilot area. Regular allowable for wells in northwestern New Mexico is 11 bbl. per day.

Operator of the pilot project, which is the northwest portion of the big pool, is Sunray Mid-Continent Oil Co. The company has already injected 31,000 bbl. of LPG into the Gallup sand and is now injecting dry gas at the rate of about 500 M.c.f. per day.

Gas Price Case Ready

. . . for decision by Supreme Court. Issue is whether state or federal Government has jurisdiction on wellhead prices.

THE SUPREME COURT will announce soon whether a state has the right to set minimum prices for natural-gas producers.

The Kansas State Corporation Commission says it has that right. The Kansas Supreme Court affirmed it. The attorneys general of Kansas and 11 other states take the same view.

Cities Service Gas Co. says the state cannot fix prices on the ground that it prevents waste. And U. S. Solicitor Gen. Lee Rankin, speaking for both the Justice Department and the Federal Power Commission, argues that the state order runs head-on into FPC jurisdiction over natural-gas rates.

The Supreme Court will make the final decision.

The case arose when Cities Service challenged a 1953 order setting a minimum price for gas produced in the Hugoton field for sale to interstate pipelines.

Arguments . . . Arguing before the high court last week, Joe Rolston, attorney for the company, made it clear the state's right to prevent waste is not at issue.

But Rolston contended that under previous decisions of the court, the FPC has the exclusive right to set prices for sales in interstate commerce. That right applies to sales at the wellhead, at issue here, as well as at the tailgate of the processing plant as in the Pomona (Oklahoma) case where the court backed the FPC.

Eleven other states which have conservation laws are actively interested in the case. Briefs supporting the stand of the Kansas authorities were filed for Arkansas, Colorado, Louisiana, Mississippi, Nebraska, New Mexico, North Dakota, Oklahoma, Texas, Utah, and Wyoming.

The states argued that the power of the FPC is not "invaded" by the Kansas price order. The Natural Gas Act, they said, was intended only to "complement" the jurisdiction of the states.

The FPC itself has recognized the states' rights, the court was told. Order 174-A expressly provided that "nothing herein shall be construed as interfering or as intended to interfere with or to prevent compliance by a natural-gas company with valid conservation orders of a state agency relating to the production or gathering of natural gas."

More important, however, the states said, was the acceptance of all independent producer rate filings containing a copy of the Kansas order now under fire.

"Thus it appears that the federal agency has on the one hand accepted without exception all independent producer rates incorporating the Kansas order in question, while it asserts here publicly for the first time that such order 'conflicts' with its powers over rates."

The position taken by Rankin, in arguing for the Government, is that the field of prices for gas for interstate movement for resale is an exclusive field for the Government.

Rankin said that 13 interstate pipelines buy gas from the Hugoton field.

"It is quite clear," he told the court, "that (the order) reaches into every pipeline that supplies important areas of the country."

Four Corners Sale

brings $7 million. Texaco wins tracts near Tohonadla.

CASH REGISTERS of the Navajo Indian tribe jingled again last week when 20 oil companies paid out $7,191,971 for leases on the Navajo Reservation in the hot Four Corners area of Utah and Arizona.

High bidder at the lease sale at Window Rock, Ariz., was The Texas Co., which paid $411.33 per acre for a tract several miles northwest of Tohonadla pool.

Of the 167,449 acres offered at the sale, the oil companies snatched up 155,924 acres. Average bid per acre was $46.12.

Some of the 76 tracts in the offering were located across the Utah border in Apache County, Arizona. High bid for Arizona acreage came from Pan American Petroleum Corp. and Superior Oil Co., which paid $213.56 per acre for one tract.

The highest per acre bid at last week's sale was much lower than the record bid paid by Carter Oil Co. at the Navajo lease sale last month (OGJ, Dec. 16, 1957, p. 63). Carter paid more than $4,300 per acre for the 240-acre parcel near big Aneth field in Utah.

Congress Will Investigate Commissions

A LONG-DELAYED congressional probe of the manner in which the Federal Power Commission is regulating the gas and power industries will get under way next week.

The FPC is one of a half-dozen agencies slated for investigation by a House commerce subcommittee headed by Rep. Morgan M. Moulder of Missouri.

The Interstate Commerce and Federal Trade commissions also are in the group to be studied.

The inquiry originally was s'anted toward the acceptance of gifts by commission officials from the industries they regulate. This brought strong objections from Oren Harris, chairman of the full committee. Hearings were delayed while the issue was fought out.

Final plans for the hearings were made by the subcommittee last week, with Harris sitting beside Moulder. The subcommittee chairman insisted there is no "conflict or controversy" now over the manner in which the probe will be made.

Aim of hearings . . . It is now planned to make only a "general survey" of the manner in which the regulatory agencies administer their laws, Moulder said. There will be no investigation of misconduct on the part of officials.

The inquiry will go into licensing and rate making, the functions of agencies in quasi judicial and quasi legislative matters, and any need for revision of the statutes under which they operate.

Moulder's legislative oversight subcommittee was set up last summer with a $250,000 budget. The move was backed by House Speaker Sam Rayburn, who had a prominent ro'e in setting up some of the commissions.

Rayburn expressed the view it was time to "go into the administration of each and every one of these (regulatory) laws to see whether or not the law as we intended it is being carried out."

Each group attacked . . . Each of the commissions under survey has had general charges leveled against it.

The FPC has been singled out for attack in the past because of its actions involving the Hell's Canyon Dam. The Federal Communications Commissioners have been charged with accepting the "loan" of TV receivers from companies they regulate. The ICC has been under fire for its handling of transportation problems, and the FTC was charged last year with dragging its feet on enforcement of cease-and-desist orders.

When the hearings start next week it is expected that the FCC will be the first agency called.

Giant tires, loaded with 5,000 gal. of fuel, rumble off to remote spot as . . .

Rough Terrain Bows to Unusual New Fuel Train

THE ARMY is shedding its dependence on conventional vehicles in moving heavy loads of liquids to remote areas over rugged or icy terrain.

A new fuel train, which uses huge rubber tires for tanks, has been developed for the U. S. Army Transportation Corps by Four Wheel Drive Auto Co. of Clintonville, Wis. It can move liquids over sand, mud, swamps, boulders, hills, ice, and deep snow.

The new transporter is made up of 10 tires, each 5 ft. high, 3½ ft. wide, and capable of carrying 500 gal. of liquids. The tires can be towed by any vehicle capable of traversing the terrain involved.

The big containers are mounted in pairs on axles and can be easily removed. Towing assemblies are equipped with filling, emptying, and braking systems. The tires, made by Goodyear Tire & Rubber Co., can be filled or emptied at the rate of 50 to 100 gal. per minute, and there's also a filtering system for direct pumping of aviation fuel.

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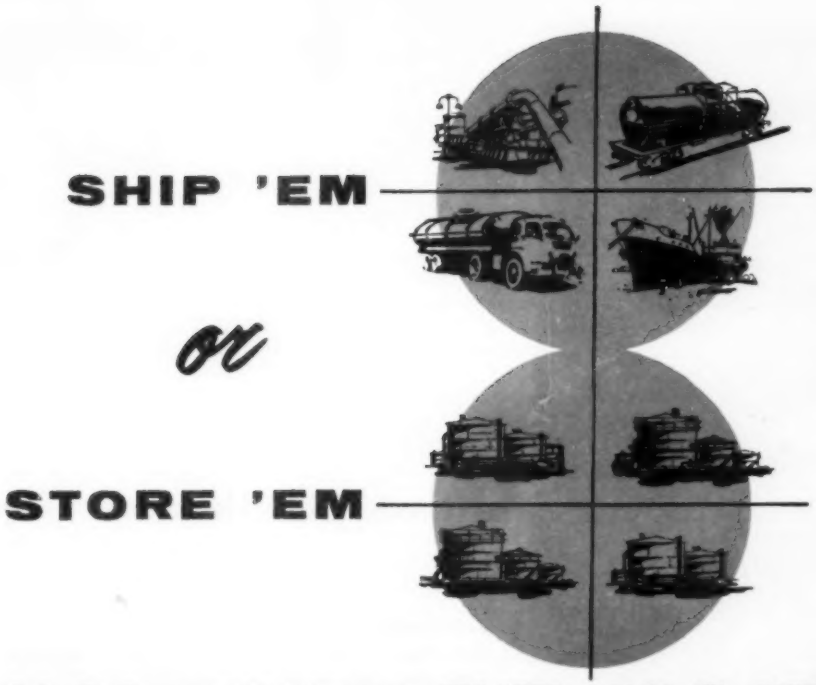

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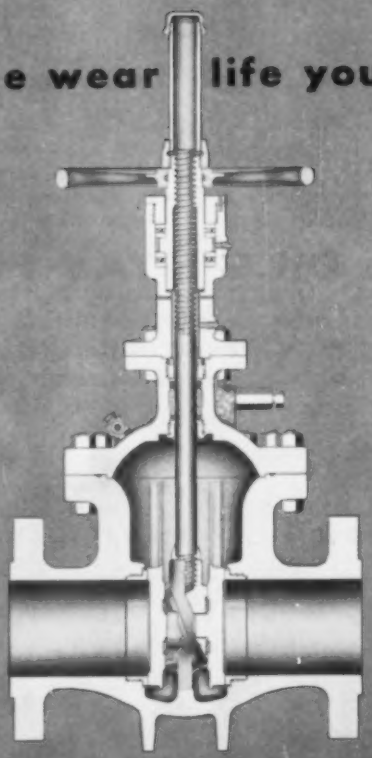

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This new Crane valve design has free-to-rotate double discs—hung independently to change seating position with every operation. Each time this valve is opened or closed, both discs are free to turn to provide cleaning action on seating contact areas, and thus prevent abrasive materials from collecting.

Disc clearances are always accurate, because the two identical discs move up and down in machined body-guide ribs—which take the service abuse usually forced on disc faces in conventional double-disc gate valves, a frequent cause of damage and costly maintenance.

Consider and compare, too, the perfect disc alignment in this smooth-working Crane pipeline valve. Annular-shaped machined wedging surfaces keep both discs and the body ring seat faces lined up at all times—and, in addition, compensate for any slight body deflections caused by line strains.

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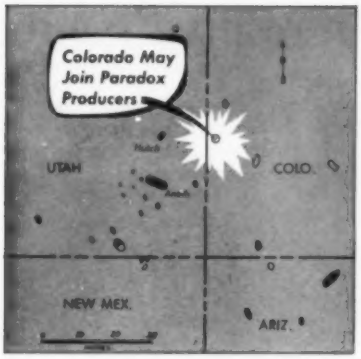


Wildcat Gets Show

near Utah-Colorado line. Test may extend basin to east.

THE LONG-AWAITED discovery of oil in the Colorado portion of the Paradox basin appears at hand.

Big Horn Powder River Corp. and Hathaway Co. recovered 1,540 ft. of clean oil on a drill-stem test of the lower Paradox-Pennsylvanian at 5,457-67 ft. at their 1 Government in Montezuma County.

The well is a few miles east of the Hatch Unit, northernmost Paradox production on the Utah side of the basin.

The recovery is the first indication of commercial oil in this part of the basin. Big Horn Powder River Corp. has another well drilling at 1-A Government, 1½ miles southwest. This one found oil shows on drill-stem test of the upper Paradox, but is now shut down until completion of the new discovery prospect.

North Dakota Test Promising

AMERADA Petroleum Corp. apparently has a Silurian oil discovery on the west flank of the Nesson anticline in McKenzie County, North Dakota, 6 miles southwest of production at Fancy Buttes field.

Recovery on a 4-hour drill-stem test at 12,622-70 ft. at the 1 Shelvik was 1,755 ft. of free oil, 1,530 ft. of mud-cat water cushion, 3,470 ft. of highly gas-cut water cushion, 360 ft. of gas-cut drilling mud, and 15 ft. of sulfur water.

This Silurian prospect underscores the growing push to pre-Madison formations in North Dakota exploration. Four deep pre-Madison wells recently were completed in Beaver Lodge field, one of them the state's deepest producer.

The 1 Shelvik is 5½ miles west of any previous drilling.

Processing briefs

Standard Oil Co. (Ohio) is incorporating a 450,000-lb. per hour carbon monoxide boiler with the new 55,000-bbl. per day fluid catalytic cracking unit under construction at Toledo. The largest of its type built, the Sohio unit will burn CO from the regenerator to recover 200 million B.t.u. of heat per hour. The boiler is costing $1,250,000. Babcock & Wilcox is building the boiler.

Detergent alkylate is being produced in Canada for the first time at Imperial Oil's Sarnia refinery. The $5-million plant will produce 30,000,000 lb. per year, completely relieving Canadian soap makers from U. S. imports. This first step in petrochemical intermediates at Imperial's Sarnia refinery will be followed by further operations of the same type when the $28,500,000 construction program is completed next summer.

American Oil Co. is now operating its new sulfur recovery unit at the new Yorktown, Va., refinery. The plant includes an absorber system which treats 21,000,000 cu. ft. of refinery gas per day. The recovery section has a capacity for 50 tons of elemental sulfur per day.

Gladewater Refining Co. has ordered a 30-day shutdown of skimming and cracking facilities at its 2,500-bbl. refinery at Gladewater, Tex.

H. F. Richardson, general manager, said the action was taken because of market pressures resulting from the industry's current excess product stocks. The refinery's catalytic reforming unit will continue operation, processing stocks already on hand. The shutdown will affect a throughput of about 2,500 bbl. daily.

Steelman Gas, Ltd., is building a new $20,000,000 natural-gasoline plant in Steelman field in southeastern Saskatchewan. The new plant, scheduled for completion in September, will process 25,000 M.c.f. of gas daily, separating dry gas, propane, butane, and sulfur. The dry gas will be sold to Saskatchewan Power Corp.

El Paso Natural Gas Products Co. will supply styrene to Rexall Drug Co. for conversion to polystyrene, a plastic material used in molding products into industrial and domestic goods. The two firms have also agreed to an extensive research program to develop new plastics. A new lab will be built at Holyoke, Mass.

Styrene will be shipped by rail from El Paso's Odessa, Tex., plant to Seamco Chemical Co. at Holyoke. Seamco is a division of Seamless Rubber Co., a Rexall subsidiary. El Paso's Odessa plant, scheduled for completion early this spring, will have a capacity of 40,000,000 lb. of styrene per year.

Ethyl Corp. has obtained patent coverage on its new antiknock gasoline additive, AK-33X. The patents cover both the class of chemicals containing a cyclopentadienyl group, a metal and other organic or inorganic groups, and AK-33X itself, which is methyl cyclopentadienyl manganese tricarbonyl.

This particular octane improver is now under test by Ethyl and by several hundred oil and other companies which have received samples. Its first use may be in aircraft, but automotive use is the main objective. Not a substitute for TEL, the new additive is expected to find use as a supplement.

Also for Refiners . . .

IN THE NEWS: Cuts in expenditures for military fuels are contained in Eisenhower's 1959 federal budget (p. 77) . . . Shell starts work on new plants at Norco, La., to make acrolein and glycerin (p. 80) . . . Fuel injection will give motorists some octane advantages, tests show (p. 80) . . . California companies cutting down production as stocks of crude and products hit postwar high (p. 84) . . . Domestic refiners again file objections to military purchases abroad (p. 85) . . . Fees in UOP sale still under dispute, but company profits still moving into fund to aid oil research (p. 86) . . . Importing ranks grow with 18 new companies filing requests for permits (p. 87) . . . Michigan crude takes its second price cut within 5 months (p. 94) . . . Greeks set up stiff rules for operator of new Athens refinery (p. 101) . . . French are planning a big refinery at Chalon-sur-Saone (p. 101).

PLUS THESE TECHNICAL REPORTS: Short cut for calculating generator heat balance in catalyst cracking (p. 121) . . . New cost control methods in refining (p. 140).

Michigan Price Cut

of 7 to 8 cents posted by Leonard. Aurora follows.

MICHIGAN CRUDE has taken its second price cut in 5 months.

Leonard Crude Oil Co., which buys approximately half the 28,000 bbl. per day produced in Michigan fields, posted lower prices of 2 to 15 cents under its previous posting. The weighted average cut is about 7 to 8 cents.

Last August Leonard led the way in cutting Michigan crude 15 cents (OGJ, Sept. 9, 1957, p. 64).

Aurora Gasoline Co., second largest buyer in the area, followed the latest cut by posting similar prices. Aurora buys 4,000 to 5,000 bbl. daily.

The price cut took Michigan crude out of the $3 class and generally fixed a base of $2.95 for sweet crude and $2.80 for black. Sour oil prices average about 35 cents under other grades.

Industry sources blamed the reduction on recent cuts of 10 to 15 cents per barrel in the nearby Illinois basin.

The development in Michigan was another sign of softening crude prices over the nation, but feeling was still strong that the industry will not suffer a general crude price cut.

So far the decreases have been localized in the lower Gulf Coast, the Tri-State area of the Illinois basin, the Corning area in Ohio, and now in Michigan. These sections represent only a small percentage of total crude produced in the country.

Severance Tax Ruling Near

THE KANSAS Supreme Court hopes to hand down an opinion before mid-February on the constitutionality of the state's 1 per cent severance tax on oil and gas production.

Final oral arguments are scheduled January 24. This would give the court enough time to make a decision before the state budgetary legislature adjourns February 14.

If the severance tax is found unconstitutional, an early decision would give the legislature a chance to act during this session. The test suit was filed by county attorneys in six western and central Kansas counties: Wilson, Barton, McPherson, Stevens, Greenwood, and Russell.

The tax, which went into effect last July, covers both operating and royalty production at the wellhead. It's expected to yield the state more than $4,000,000 annually.

Pipeline briefs

Gulf Refining Co. is building a 60-mile, 8-in. line from Barbers Hill to Port Arthur, Tex., to be completed in March. The line will be a plant facility of Warren Petroleum Corp., a Gulf affiliate. It will transport primarily propane and natural gasoline from Warren's terminal and underground storage at Barbers Hill to its Port Arthur terminal and the Gulf Port Arthur refinery. The Barbers Hill terminal receives products from West Texas and New Mexico gasoline plants through Gulf's 530-mile, 10-in. line originating near Midland.

New York State Natural Gas Corp., subsidiary of Consolidated Natural Gas Co., has budgeted $12 million for additions and improvements to production and pipeline facilities this year. This compares with $14 million spent last year. The company plans to replace 12 miles of 20-in. with 30-in. pipe and replace 13 miles of 12-in. with 20-in. in Pennsylvania.

The drilling schedule calls for 38 new wells and redrilling and reconditioning of 19 wells for storage. Last year 53 new wells were drilled, including 43 producers with total open flow potential of 262,000 M.c.f. daily. Gas produced by the company and purchased locally in its Pennsylvania-New York-Ohio distributing area amounted to 22 per cent of its total supply of 141.7 billion cubic feet. Offshore drilling is planned this spring on two Lake Erie tracts leased from Pennsylvania.

Northern Natural Gas Co. is laying 27.6 miles of 30-in. loops along its main line in the Texas and Oklahoma panhandles. The Federal Power Commission gave temporary approval to the $3,020,000 project. There will be 9.3 miles of line north of the Sunray, Tex., station and 18.3 miles north of the Beaver station. Northern says it will save up to $100,000 by constructing these facilities at the same time as previously authorized loops.

R. H. Fulton & Co., contractor on 85 miles of scattered loops just completed, also is laying the newly approved lines. Completion is scheduled next month.

El Paso Natural Gas Co. has received temporary authority from the Federal Power Commission to build 21 miles of 10-in. pipeline and 18 miles of 8-in. in Pecos and Ward counties, Texas. The facilities will enable El Paso to purchase 10,000,000 cu. ft. daily of gas which is being flared. Santa Rosa Gas Co. will sell the gas. After the first year, purchases will increase to 14,000,000 cu ft. daily.

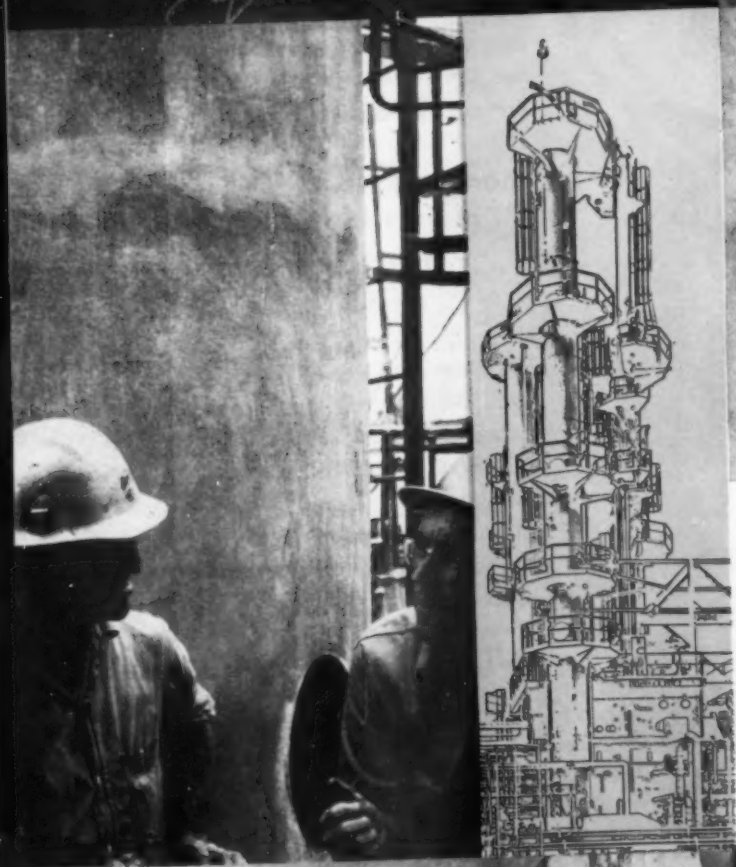
Lone Star Gas Co. has applied to the Federal Power Commission for a permit to install facilities needed to store natural gas in Ambassador field of Clay County, North Texas. Ambassador field takes in 174 acres about 20 miles southeast of Wichita Falls. Lone Star estimates the $740,000 project will recover an added 472,907 bbl. of oil from the pool and that gas capacity after the oil is recovered will be about 2½ billion cubic feet. Storage gas would come principally from Oklahoma fields. The project already has been approved by the Texas Railroad Commission.

Plymouth Oil Co. has organized Plymouth Pipe Line Co. as a wholly owned subsidiary to purchase 12 per cent interest in the 350-mile Bayou Pipe Line System from Baytown, Tex., to Baton Rouge, La. Plymouth bought into the line by taking over a portion of the ownership of Shell Pipe Line Corp., which operates the products system for itself and other owners.

Also for Pipeliners . . .

IN THE NEWS: Blasting with fertilizer helps build a pipeline in rough country of West Texas (p. 78) . . . Price range of natural gas is 3.57 to 21.4 cents per M.c.f., new study reveals (p. 80) . . . Opponents of Harris bill have lost no time in opening up the attack (p. 81) . . . Oversupply of oil in California is making market prospects dim for San Juan crude moving over Four Corners pipeline (p. 84) . . . Head of pipeline contractors sees bright future in pipelining (p. 85) . . . Switch of Little Inch from gas to products is near final hurdle (p. 85) . . . Colorado Interstate is trying to enlist aid of its customers to settle its natural-gas rate cases (p. 97) . . . Great Lakes moving its billionth barrel of products (p. 98) . . . Sahara crude is moving to Mediterranean for first time (p. 100).

PLUS THESE TECHNICAL REPORTS: What's been happening to contractors' costs and prices (p. 106) . . . Directory of pipeline contractors (p. 119) . . . Pipeline construction report (p. 164).



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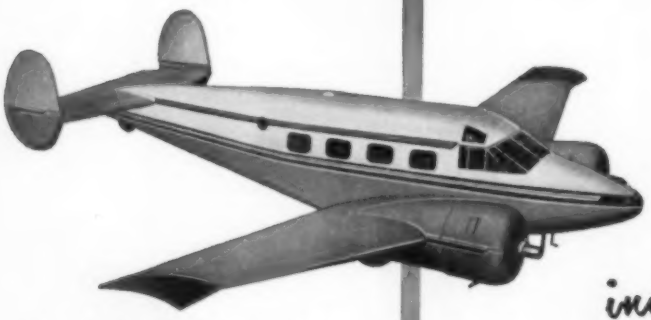

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The four-place *Beechcraft* Travel Air
RANGE.....up to 1,410 miles nonstop
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The four-place *Beechcraft* Bonanza
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Troubled Gas Firm Asks Help

. . . from its customers to meet demands of FPC. Colorado Interstate plans to negotiate soon for new rate schedule.

COLORADO INTERSTATE GAS CO. is trying to enlist the aid of its customers to settle its natural gas rate cases and pull itself out of a financial hole.

Caught in a bind by long time lags of the Federal Power Commission, Colorado Interstate has been collecting rate increases subject to refund since January 1, 1954. Currently $67 million—more than half of the firm's total assets of $130 million—is tied up in the rate cases.

W. E. Mueller, CIG president, announced last week he is willing to negotiate new rates with the cities and firms supplied by CIG in order to regain sound financial footing.

Purchasers of gas from CIG are Public Service Co. of Colorado, Colorado-Wyoming Gas Co., the city of Colorado Springs, the utility company at Pueblo, Colo, and Citizens Utility Co., which supplies several communities in southeastern Colorado.

Initial negotiations are expected to begin soon with Public Service Co. Denver city officials and members of the Colorado Public Utilities Commission will sit in on the sessions. Residents of Denver purchase their gas from Public Service Co.

"What we plan to do," a CIG spokesman said, "is outline to our customers what we have done since 1954, when we were last able to issue a stable financial statement to our stockholders.

"If our customers will support us, then we will go before the FPC and ask the agency to accept the negotiated rates. We do not know at this time what these rates might be."

CIG decided on this course of action after the Circuit Court of Appeals for the District of Columbia ruled in the Memphis case that gas pipelines must get customer consent for rate increases.

The money involved . . . The first of four rate increases put into effect by CIG and passed on to customers by the various distributors went into effect September 2, 1953. It totaled $6½ million. The second, amounting to $10,269,000, went into effect July 30, 1954. The third, for $3,137,000, began December 17, 1956. A fourth rate increase of $2,553,000 goes into effect February 1.

The city of Denver filed motions last week asking the FPC to dismiss all four rate cases in which the city had sought refunds amounting to about 40 per cent of the $67 million impounded. The city based its motion on the Memphis-case ruling.

Last May Denver obtained a favorable initial decision from an FPC examiner requiring CIG to lower its rates by $15 million a year and refund $33 million. The two cases have been appealed to the FPC by the company, but no decision has been handed down.

The unfavorable rulings by FPC Examiner Samuel Binder forced CIG to arrange short-term financing to tide the company over until the full commission reviewed Binder's decision. Otherwise, the company president said, CIG faced certain bankruptcy.

The Memphis decision also caused CIG and two participating firms, Natural Gas Pipeline Co. of America and Pacific Northwest Pipeline Corp., to postpone their $182 million Beatrice project expansion program to boost the supply of natural gas in the Midwest area, principally to Chicago. CIG's share of the project was estimated at about $87 million.

THE CITY of Fillmore, Calif., has granted Richfield the oil rights on this roadway. Oil play has now moved within the city limits (circled wells).

New Oil Plan: Lease a Road

CALIFORNIA has added a new chapter to its book of leasing oddities.

The city fathers of Fillmore leased all the city-owned lands in their small Santa Clara Valley community and then cast about for more acreage. They found it: 2.02 acres of roadway.

The new lease, which went to Richfield Oil Corp., consists of a highway recently turned back to Fillmore by the state. Richfield will pay $400 per acre per year, plus one-fifth royalty.

The Fillmore area of Ventura County currently is one of California's most active drilling areas. Nine rigs are at work dri ling 14,000-ft. wells.

The discovery area is more than 2 miles southwest of town, but development drilling has been steadily northeast. Now rigs are popping up in Fillmore itself. Some of them have plastic soundproofing.

OCAW to Set Policy

. . . at February meeting. Wage increase and shorter work week are on agenda of 52-member bargaining committee.

THE bargaining policy committee of the Oil, Chemical and Atomic Workers International Union will meet in Denver February 22-23 to establish mandatory policies for 1958 negotiations in the oil and petrochemical industries.

OCAW Presidnt O. A. Knight set the meeting dates for the 52-member committee last week.

"We intend to recommend some short range goals, including an improvement in the wage situation, and we also plan to recommend a long-range program of major improvements," Knight said.

The committee is composed of 32 rank-and-file members and 20 full-time OCAW leaders.

Help from all . . . Knight urged participation of all locals in the programs to be drafted by the committee. The union's total membership includes 105,000 oil workers.

"In collective bargaining we can do a far better job as a team in a planned and dynamic program," he said. "But we have just scratched the surface."

Knight declined to disclose 1958 wage goals.

OCAW settled in 1957 for a 6 per cent increase, plus double time and a half for holiday work, an eighth paid holiday annually and 4 weeks' vacation after 20 years.

New idea . . . Knight recently suggested that the union membership consider seeking "royalty payments" on plant production as a supplement to hourly wages.

Although Knight's idea was termed a long-range bargaining goal, a similar plan was announced last week by another AFL-CIO affiliate, the giant United Automobile Workers. The UAW proposed that company profits above 10 per cent (before taxes on net capital) be divided among workers, consumers, company executives, and stockholders.

Under Knight's plan, royalties would be collected on production in the oil, chemical, and atomic industries and prorated to the account of each wage earner affected.

A BRAND NEW products system was launched with the turn of a valve in 1931 . . .

AND A FLICK of an electric switch 27 years later sets a precedent as . . .

Great Lakes Transports Its Billionth Barrel

A UNIQUE PLACE in products pipelining went to Great Lakes Pipe Line Co. when the billionth barrel of products pulsed through the giant system earlier this month. No other products pipeline company has ever moved so large a volume.

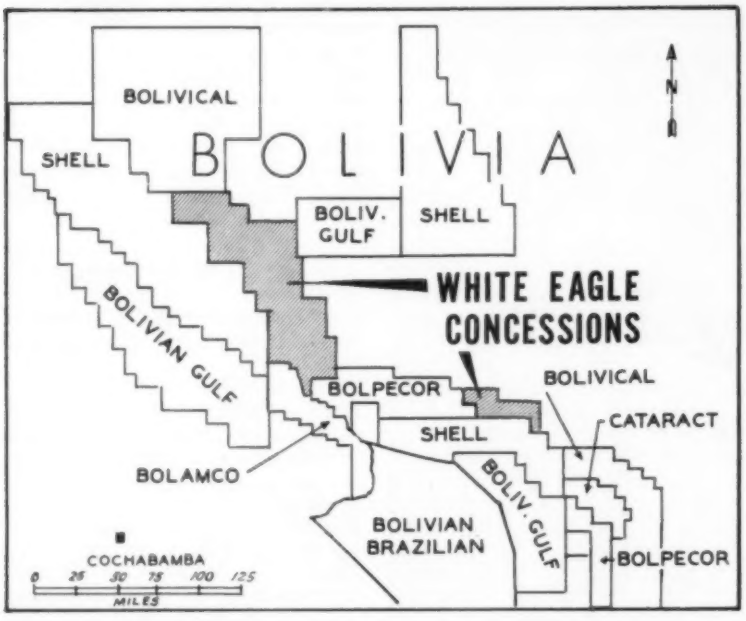
The first barrel flowed through the system back in 1931 when Harry Moreland, then vice president and general manager, turned the valve to help launch the fledgling company as a products carrier (left photo). At that time, the system included 1,237 miles of 4 to 8-in. line.

The same Harry Moreland, now president of the firm, pushed the button to send the billionth barrel through the system earlier this month (right photo). Watching Moreland are, left to right, R. L. Wagner, administrative vice president; W. A. Ryan, manager, operating division; and C. C. Keane, chief engineer.

The company now has 5,808 miles of 4 to 12-in. line stretching from Oklahoma through Kansas, Missouri, Nebraska, Iowa, Illinois, Wisconsin, Minnesota, South Dakota, and North Dakota.

Great Lakes is currently moving more oil in an average month than was transported during 1932, the first complete year of operation.

Deliveries are now made from 15 company-owned terminals and 11 facilities owned by shippers or other pipelines into which Great Lakes makes deliveries.



Big Bolivian Concession

. . . goes to three American independents headed by White Eagle. Deal calls for annual investment of $600,000.

A NEW CONCESSION in Bolivia, covering 2,223,900 acres in the central part of the country, has been awarded to three U. S. independent oil companies.

White Eagle International Oil Co., Blackwell Oil & Gas Co., and Western Hemisphere Petroleum Corp., all headquartered in Tulsa, received word of the Bolivian Government's approval last week. The request had been pending since September.

The acreage is east of La Paz, and northeast of the town of Cochabamba. This is north of established production in the southern part of the country. The blocks border on concessions held by Bolivian Gulf Oil Co., Shell Oil Co., Bolivian California Co. (Standard of California), Bolivian American Oil Co. (United States Corp.) and Bolivian Petroleum Corp. (Drilling & Exploration Co., Inc.).

Operator of the new concession will be White Eagle International, an affiliate of White Eagle Oil Co. and a sister company of Helmerich & Payne, Inc., Tulsa drilling contractor.

Exploratory work must begin by mid-July. Drilling program has not been announced yet, but White Eagle officials say plans will be worked out soon.

The agreement . . . No bonus was paid for the acreage. The agreement, based on standard provisions of the 1955 Bolivian oil code, calls for an 11 per cent royalty on any crude oil produced in Bolivia's Zone 1, where more than 1,200,000 acres of the concession are located.

The remaining 988,000 acres are located in Zone 2. In this area, the government can reduce royalty from 11 per cent to 7½ per cent during the first 15 years of development.

Bolivia can collect 30 per cent of the net profits as tax, but in computing the profit, operators are permitted 27½ per cent depletion allowance. If the profits are considered "excessive," the Bolivian Government can share in 50 per cent of the profits.

A minimum exploratory obligation is required. In Zone 1, operators must invest $400,000 per year, and in Zone 2, $200,000 per year. Operators can wait 4 years to fulfill minimum obligations.

Interest grows . . . This is the third big concession granted by the Bolivian Government in the past 2 months. Early in December, Drilling & Exploration Co., Inc., Dallas, won concessions totaling about 1,250,000 acres.

Late last month the Bolivian Government granted a 360,000-acre concession to Bolivian American Oil Co., a subsidiary of United States Corp.

A number of other American firms have gained concessions since 1955 when the government issued a new oil code which is generally favorable to foreign capital.

Two firms, Bolivian Gulf Oil Co., and Chaco Petroleum, S.A., have drilling programs under way. Bolivian Gulf is also helping the country build a 217-mile crude line from Sicasica, Bolivia, to Arica on the Chilean Coast (OGJ, Nov. 25, 1957, p. 78).

The line, which will be completed by next October, should be a stimulus to exploration in the inland country. Daily production from all Bolivian fields last year averaged 9,360 bbl., which is greater than domestic demand.

Other holdings . . . The new concession is the first Bolivian acreage for the three firms. White Eagle International has concessions in Cuba, and a sister company, White Eagle Overseas Oil Co., Inc., owns acreage in the Philippines. Helmerich & Payne has nine rigs in Venezuela.

Western Hemisphere is headed by Russell Cobb, Jr., who has interests in concessions in Cuba, Colombia, Honduras, and Haiti. The third owner, Blackwell Oil & Gas, has confined its interests to domestic operations.

Africa Attracts Plymouth Oil

PLYMOUTH OIL CO. is joining the ranks of independents moving into the Eastern Hemisphere.

The Pittsburgh-based firm is wrapping up a deal with Ste. Africaine des Petroles for a minority interest in a 2,400,000-acre concession on the Ivory Coast of West Africa.

The French company will have 51 per cent interest and will be operator. Plymouth Oil will have 39 per cent. Benedum-Trees Oil Co., also based in Pittsburgh, will have the remaining 10 per cent.

The agreement will become final when it receives official approval from the French Government.

W. S. Hallanan, Plymouth president, said his company was attracted by seeps in the eastern part of the concession and by old shallow wells drilled in Ghana to the east. No recent drilling has been done.

Sahara Crude Moving

. . . to Mediterranean for first time in spite of Nationalist efforts to halt shipments to France. The amount is small.

THE FIRST SAHARA oil reached the Mediterranean last week just a few days after the French completed their fifth Hassi Messaoud producer along a 12½-mile trend.

The initial 1,500 bbl. of the 43°-gravity sweet crude was pumped into storage at Philippeville on the northern Algerian coast.

More symbolic than anything else, this first dribble of crude is the result of France's feverish efforts to prove to the world and her own people that the Sahara holds oil. Moving the oil north has been expensive for the French (OGJ, Oct. 28, 1957, p. 87). It probably will get even more costly.

New producer . . . The fourth stepout from the spectacular Hassi Messaoud discovery has an 1,800-bbl. daily potential.

The latest well to be completed in the field is MD 4 northeast of the discovery 2.4 miles. The well was bottomed at 11,175 ft. It tested 75 bbl. an hour under wellhead pressure of 2,560 psi. The bit cut 200 ft. of the Cambro Ordovician sandstone pay before the test was made.

The rig from this well has been moved to a new location for MD 7, 6.6 miles southwest of the discovery.

Three more wells may help establish the width of the Hassi Messaoud structure. A fourth, OM 81, now drilling below 10,600 ft. could extend it another 5 miles to the north. All four are nearing the pay depth.

The farthest stepout yet to the south and west, MD 6, was spudded last week. It is almost 12 miles west-southwest of the discovery and slightly more than 5 miles west of MD 2.

Moving the crude . . . The first load of Hassi Messaoud crude reached the Algerian coast after a 380-mile trip north by pipeline and railroad.

The first tank cars narrowly missed an explosion on the way in spite of heavy French security wraps on the shipment. The railroad blast is what the French have expected. It was only the beginning of Algerian Nationalist efforts to keep the French from moving the oil out of the desert.

The 255-mile railroad from Touggourt to Philippeville was mined by the Nationalists, but the blast caught a southbound freight pulling empty tank cars to the terminal of the 6-in. pipeline at Touggourt. The train hauling the first oil northward was only a few hours away.

A second train hauling more oil was not far behind the first, but the French aren't talking about future shipments or the frequency of the movements. They hope to make the first large-scale shipment of the crude from Philippeville by tanker about the middle of February.

The first tanker will head almost due north for the short 300-mile trip across the Mediterranean to the 54,000-bbl. daily refinery at Lavera, near Martigues on the southern French coast.

Hurry-up job . . . The French built the 124-mile, 6-in. line from the field to Touggourt in a hasty effort to get the oil moving regardless of cost. It is pumped into storage at Touggourt and then loaded into tank cars for the rail trip of about 255 miles to the coast.

So far there has been no reported effort by the Nationalists to cut the pipeline. The railroad is far more vulnerable. Both the railroad and the line are being heavily guarded and patrolled. The oil-hauling trains not only carry French troops and have troops stationed at 6-mile intervals along the railroad but have air cover as well. In spite of these precautions the trains move only during daylight.

The first tanker of Hassi Messaoud crude to leave Algeria next month won't make a ripple in France's domestic consumption of oil, but as a symbol of the future it's the biggest thing that has happened to France since Napoleon.

Esso's Libya Well

plugs back to test promising shows. Deeper zones dry.

ESSO STANDARD (Libya), Inc., has bottomed its possible discovery in Fezzan and is now testing the third zone since setting casing.

The company took Atshan 2 to 2,900 ft. where salt water was encountered. The hole was plugged back about 200 ft. for the second test. When this proved negative, the well was plugged back farther for a test from 2,100 to 2,140 ft.

The Standard Oil Co. (N.J.), subsidiary, found very encouraging shows in this 40-ft. section while the well was drilling. It was the first company to find an oil show in fast-blossoming oil play in Libya.

The well is on a Fezzan concession bordering Algeria. It is 45 miles southeast of the shallow Edjele field discovered by CREPS across the border 2 years ago.

Gas shows were encountered in Atshan 1, 1½ miles east on the same structure. Esso's first well was Haghe 1, 36 miles south (OGJ, Jan. 6, p. 88).

Atshan is 580 miles south of Tripoli, the nearest terminal possibility. A pipeline would cost an estimated $80 million.

Greeks Won't Sell

refinery. Government sets up stiff rules for operator.

THE COMPANY that wins the right to operate the new 30,000-bbl. Greek refinery near Athens has already agreed to some stiff requirements.

The government is expected to name the operator for the $25,000,000 plant at any time. The opening has been delayed by a call for a second round of bids. These were required after an earlier award to a Greek-American group fell through.

But in asking for new offers, the government made minimum requirements tougher. Companies could no longer bid to buy the refinery outright. They had to agree to lease the plant, or manage it under government supervision.

Interested companies also had to deposit a $500,000 guarantee. The minimum rental will be at least 90.5 per cent of the net profit, and a Greek corporation must be set up with a capitalization of $1,600,000.

The winning bidder also must run a training program that will enable native Greeks to handle all but 10 refining jobs within 3 years. The lease on the plant will be for 10 years.

Market promised . . . On the plus side, one of the attractions is a ready-made market. The government will insist that local marketing companies buy all their gasoline from the new plant. At least 85 per cent of other products also will have a guaranteed market.

One original bidder reportedly turned a cold shoulder to the new government requirements. Royal Dutch-Shell was interested only in outright purchase of the plant. However, British Petroleum Co., Ltd., offered to lease the plant to begin with.

The government has extended the contract of its technical advisor, George Armistead & Co., Washington, to enable the consultants to start initial operations.

Reds Woo Latin America

. . . with oil trade agreements. Soviets dangle credit before hard-pressed Brazil. Argentina eyes Russian equipment.

SOVIET RUSSIA is probing away at the soft underbelly of U. S. influence in the Western Hemisphere at the spot where it is most vulnerable—the state-owned oil industries in Argentina and Brazil.

The Russian moves came at almost the same time President Eisenhower was warning Congress that the Soviets' offer of widespread aid to underdeveloped countries is a threat to the West.

Here are two developments that have official Washington concerned:

. . . Brazil has been offered a trade agreement that carries with it $1 billion in credits. This easy financing scheme is downright dazzling to Petrobras, Brazil's government oil company, already hard pressed to buy drilling equipment and refining materials.

The trade-agreement offer is being seriously considered by Brazil's foreign ministry. It was originally offered through Col. Tito Lemo do Canto, a Brazilian who is director of a trading firm called Torgbraz. The concern has Russian partners.

Canto is now trying to make a deal to sell 5,000 Russian-made Moskvich automobiles at discount prices through a Brazilian Army club.

. . . An Argentine trade mission, including representatives of Yacimientos Petroliferos Fiscales, is on its way to Moscow to talk equipment with the Russians. The Argentine mission has a $30-million trade balance from previous deals with Russia.

Generally considered pro-American, Brazil's President Jucelino Kubitschek last week conceded the danger involved in dealing with the Communists, but added that the Soviet offers were so attractive they deserve study.

Argentina's official position was more to the point. It needs machinery and equipment and says it doesn't care where it comes from.

Demand increases . . . The Russian choice for an area for its trade penetration couldn't be more damaging to the U. S. Both Brazil and Argentina have clung tenaciously to their state-owned oil monopolies.

It has been a costly policy for both. Neither has been able to develop known oil prospects enough to supply a constantly rising internal demand. Oil imports to meet this demand are a progressively heavy drain on already anemic economies in both countries.

Plugging free enterprise, Washington has never looked with favor on financial aid to state-owned businesses. The Russians now can capitalize on this policy.

Washington will have to decide whether the Russians can deliver what the Latin Americans want and need, or if Brazil and Argentina might be playing the old "communist threat" game to soften up Uncle Sam.

Big French Refinery Planned

A PRIVATE French company with some well-known connections will build the first refinery to take advantage of the proposed Marseille-Rotterdam pipeline system.

Omnium Francaise des Petroles expects to have a 60,000-bbl. plant on stream at Chalon-sur-Saone by 1961. It will take feed from a 260-mile, 22-in. line running north from Marseille.

Owners of Omnium include the Banque de Paris and the old Suez Canal Co. The company is also the partner of Phillips Petroleum Co. in bids for concessions in Algeria, where Omnium hopes to develop supplies for the refinery. Another partner is a subsidiary of the French Government's Bureau des Recherches de Petrole.

If the Omnium-Phillips-BRP group wins acreage and finds oil, a refinery and a well-developed marketing organization will be waiting for it.

Whether crude is from Algeria or the Middle East, Omnium plans to supply products to central and eastern France. Prices in these areas are the highest in the country due to transportation costs. The company's service-station network also extends into Italy and Switzerland.

Chalon-sur-Saone lies on the obvious route for a trans-European pipeline system. A line running up the Rhone and Saone River Valley can reach the French interior, avoiding French Alps to the east and hill country to the west.

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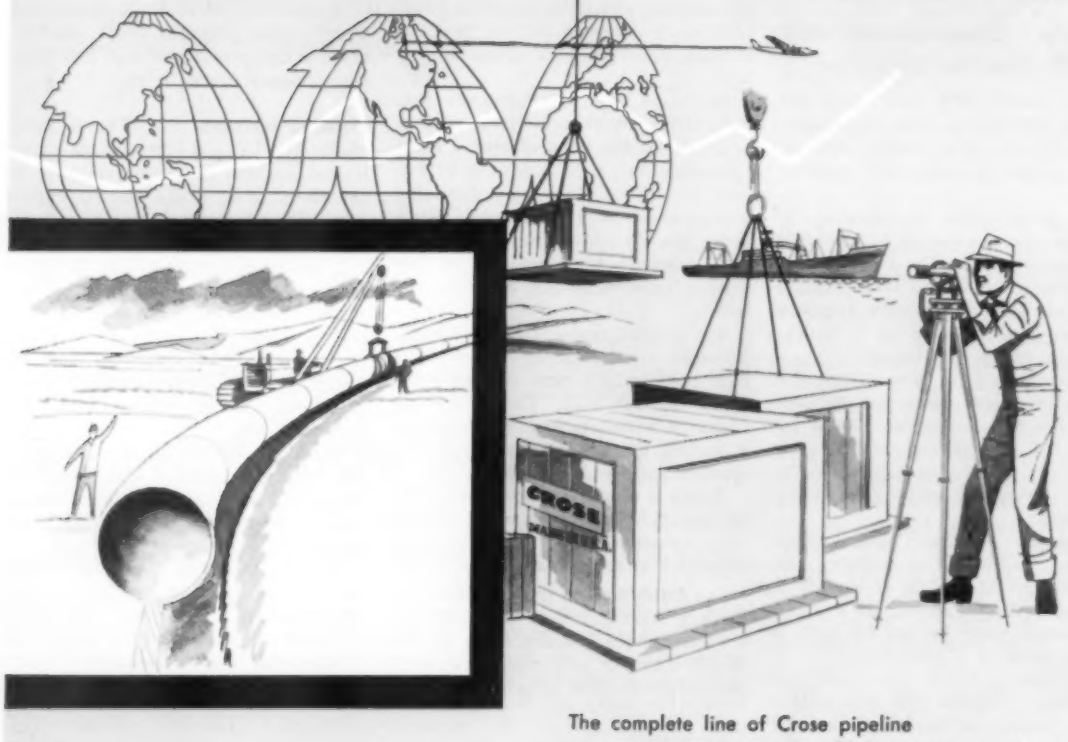

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Kuwait Drives Hard Bargain

. . . with Japanese negotiator for its part of Neutral Zone offshore concession. Reason: Kuwait has no oil worries.

LITTLE KUWAIT, looking forward to opening its big northern field, now appears in no hurry to close a deal for its part of Neutral Zone offshore concession.

The Japanese group which tied down Saudi Arabia's undivided half interest in Neutral Zone waters is snagged in efforts to get the same kind of deal with Kuwait.

It was becoming more apparent last week that the Japanese may have to settle for a joint operation with an oil company, either British or American.

Taro Yamashita, the Japanese who negotiated the deal with Saudi Arabia, is now trying to do the same in Kuwait. He said last week that a Royal Dutch-Shell company has approached him on a joint operation. Yamashita said his company would turn down the proposal.

He also said that another company, which he did not identify, has made offers directly to Kuwait. Industry rumors for 2 weeks have identified at least one of these interested companies as the H. L. Hunt interests. Hunt spokesmen in this country say they have no knowledge of such a concession bid.

The deal between the Japanese and Saudis giving Saudi Arabia 56 per cent of the profits has been called a major break in the standard 50-50 pattern (OGJ, Dec. 30, 1957, p. 119). Apparently Kuwait officials either are not satisfied that the new formula is to their advantage or they hope to get still better terms.

Yamashita's Japan Arabia Oil Co. has other problems, too. He learned on his return to Tokyo last week that the Japanese Government has turned thumbs down on a $640,000 subsidy which the newly formed oil company wanted for 1958. The 63 Japanese industrial concerns backing Yamashita's new company have borrowed $10 million from Japanese banks. The money has been placed in escrow in Tokyo.

Raudhatain pipeline . . . Regardless of the outcome of its talks with the Japanese, Kuwait has no worries over its production potential.

Kuwait Oil Co., Ltd., has scheduled a 70-mile, 30-in. pipeline from Raudhatain field in the north to a new jetty under construction at Mina-al-Ahmadi. Commercial production will begin next year.

The new jetty will accommodate three 100,000-ton tankers at the same time. It will be able to handle about 1,000,000 bbl. daily when completed in mid-1959.

The existing jetty recently was expanded to move up to 1,500,000 bbl. daily. Offtake facilities from Burgan and Magwa-Ahmadi fields in the south are being enlarged. New tankage is under construction at Mina-al-Ahmadi.

When all parts of the project are completed, Kuwait Oil could move 2,500,000 bbl. daily under normal operating conditions.

The Kuwait position . . . Raudhatain was discovered 2 years ago 70 miles north of present production. Four wells spread over 20 miles are producers, Raudhatain Nos. 1 and 2, Bahrah 2, and Sabniya 1. (OGJ, Feb. 18, 1957, p. 119).

Kuwait is the leading Middle East producer. It averaged about 1,120,000 bbl. daily last year from 230 flowing wells. The shaikhdom also has half interest in about 100,000 bbl. daily produced in the Neutral Zone. Kuwait's concession in the zone is held by American Independent Oil Co.

Besides the owners of Kuwait Oil, Gulf Oil Corp., and British Petroleum Co., Ltd., Royal Dutch-Shell is one of the leading users of Kuwait crude. Under a special agreement, Shell can buy up to 13 billion barrels over the next 70 years from Gulf Oil's half share of production.

Tender Joins Nigerian Search

SHELL-BP Development Co. of Nigeria is getting ready to explore thousands of square miles of tidal mangrove swamps in the Niger River Delta on Africa's Atlantic Coast.

Equipment for the big program includes this drilling tender, resting at Port Harcourt, Nigeria, after a 4,000-mile, 6-week tow from the Netherlands. Shell-BP ordered the tender as part of its expanding operations on a 40,000-sq.-mile concession.

The tender, which measures 158 ft. by 80 ft., will service a heavy rig set up on a drilling platform. It can support drilling operations for up to 30 days.

The tidal swamps extend 30 to 40 miles from the coast. At high tide the swamps are flooded to 4 ft. or more. No wells have been drilled in the swamps. The first wildcat will be located 20 miles south of Port Harcourt in the New Calabar River estuary.

Shell-BP has already discovered two fields with commercial possibilities on the mainland. Crude from Oloibiri field is being barged, pending completion of a temporary 65-mile, 10-in. pipeline to Port Harcourt. Afam pool is due to go on production at any time. Output will move through a 30-mile temporary line.

Derricks crowd a Balkan hillside where even a barrel a day is worth while.

Russia Stepping Up Little Albania's Output

RUSSIA'S growing ambition in the Mediterranean has brought what must seem like a big oil boom to the tiny country of Albania.

Albania's production has more than doubled since 1951, a new refinery has gone on stream, and the government has doubled its wildcat efforts in the current 5-year plan which ends in 1960.

The small Balkan country is Russia's only Mediterranean satellite and is separated from other Russian satellites by Yugoslavia, which broke off from Russian-style communism in 1948.

Here's Albania's oil record after more than 11 years of Soviet domination:

... **Production,** though small, has been climbing steadily. Output averaged 4,400 bbl. daily in 1955, and jumped to 5,600 bbl. per day in 1956.

... **Exploration** in Albania's mountainous terrain had a slow start after World War II, with only 18 wildcats drilled from 1946 to 1953. But in 1954 a sharp upward trend began. Last year, Albania drilled 72,160 ft. in an attempt to find more new fields.

Last year a special exploration office was set up to help supervise the country's 18 drilling crews and 6 derrick-construction crews.

... **Refining** has increased under Russian supervision. A new plant at Cerrik processes about 2,740 bbl. of crude per day from Patos field.

Albania claims the country is now processing all the oil it produces. Several obsolete plants have been rebuilt and their throughput tripled.

The new refining capacity is probably helping to supply the growing number of Soviet submarines, cruisers, and destroyers using the port of Durres and the island of Saseno as Mediterranean bases.

Largest field in Albania is Patos pool, which accounts for 83 per cent of the nation's total output. It produces from the Eocene and Pliocene at depths ranging from 429 ft. to 4,265 ft.

Second largest is at Kucova, which has a large number of low-yield wells (photo). Many pump only 1 bbl. a day. Some "have no equipment and are bailed periodically," according to the Soviet magazine Neftyanoye Khoziaistvo.

Russian advisers and technologists still guide the Albanian oil industry, but more and more Albanians are being trained as petroleum engineers in the U.S.S.R. and Rumania. Some schools have been set up in Albania.

Talk of Change to 50-50 Split Draws Fire

THE TRINIDAD Government's plan to change its oil laws to provide for a 50-50 split with companies operating there has sparked opposition.

The opposition is coming from at least two of the island's leading newspapers. Both warned the government it might be killing the goose that lays the golden eggs.

The new chief minister, Dr. Eric Williams, held up his budget for a month to confer with Venezuelan officials about the Venezuelan law. Then he told his legislative council he wants the oil companies to pay the government a minimum of 50 per cent of their profits beginning in 1958.

Present oil royalties range from 10 to 12½ per cent of the field-storage value of the crude. Rentals, income taxes, and other taxes take more of a bite, but far less than 50 per cent.

Williams also attacked the depletion allowance granted little more than a year ago for offshore operations. He called it an example of "political irresponsibility."

Discovery denied . . . Williams told his legislative council that the three Soldado wells in Trinidad's only offshore field are producing 2,000 bbl. daily. He also said Dominion Oil Co.'s offshore test, Couva Marine 1, tested 295 bbl. an hour on a test.

Dominion Oil's parent company, Standard Oil Co. of California, last week called Williams report "unfounded." Socal said no oil has been found in the well which is still drilling below 5,000 ft. in a complex faulted area.

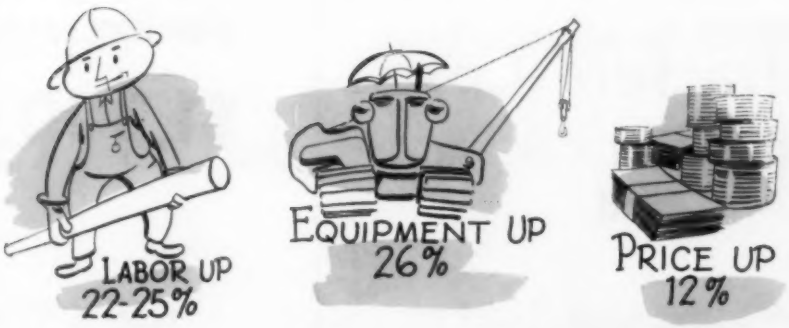
The Trinidad Chronicle warned that Williams' plan might influence firms to write off "already expensive drilling" as not "worth the bother."

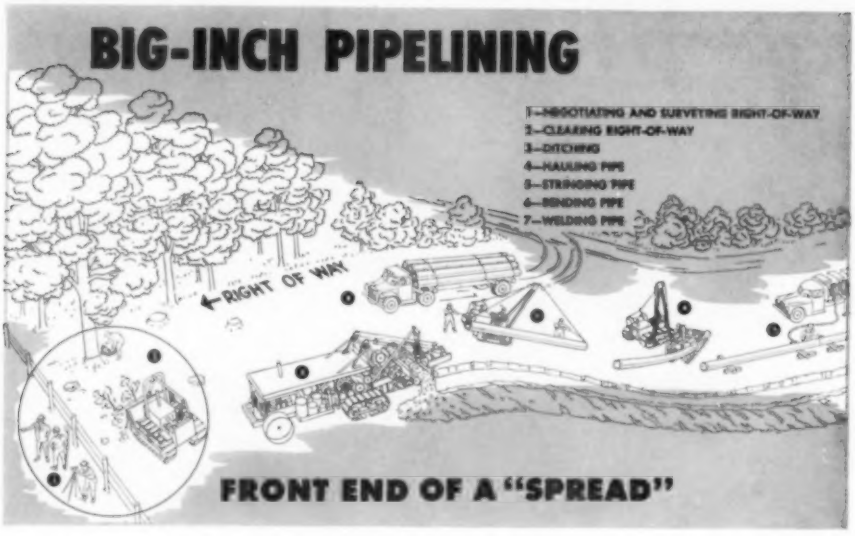
A SPECIAL REPORT ON

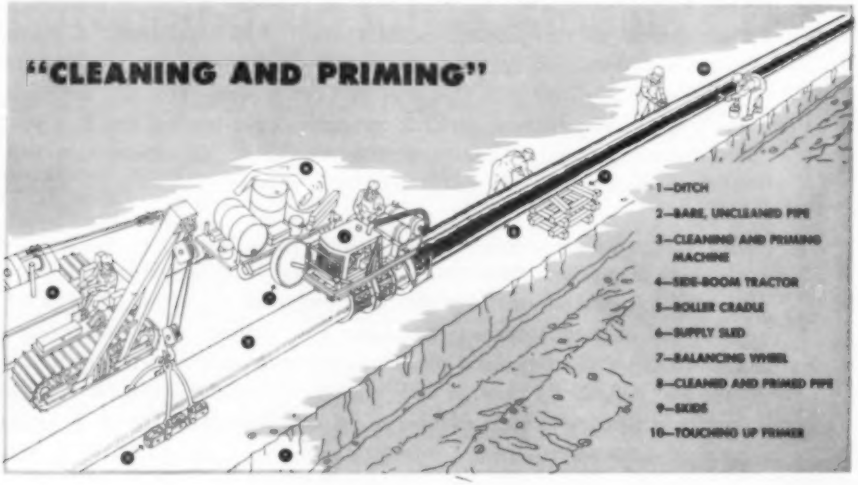
Pipeline Contractors' Costs

THE pipeline-contracting industry as it exists today is both a product and a component of the pipeline industry which has experienced a postwar boom in construction, particularly in crosscountry gas lines. Contractors lay virtually all of the pipe that goes into the ground. This was not always so. It is so today because pipeline companies have learned that it is sound business economics to leave to contractors the job of construction which they as specialists can do better and more cheaply.

This delegation of responsibility is prudent, as is borne out in the revealing study of pipeline contractors' costs by Paul Reed and Gene Kinney, the Journal's pipeline editors. It proves that companies are getting their money's worth out of their construction dollar. The analysis on the following 15 pages is based on data from pipeline companies; contractors, both individually and collectively through their industry association; manufacturers and dealers in equipment and machinery; and cost indexes of the U. S. Department of Commerce.







What's been happening to

Contractors' Costs

and

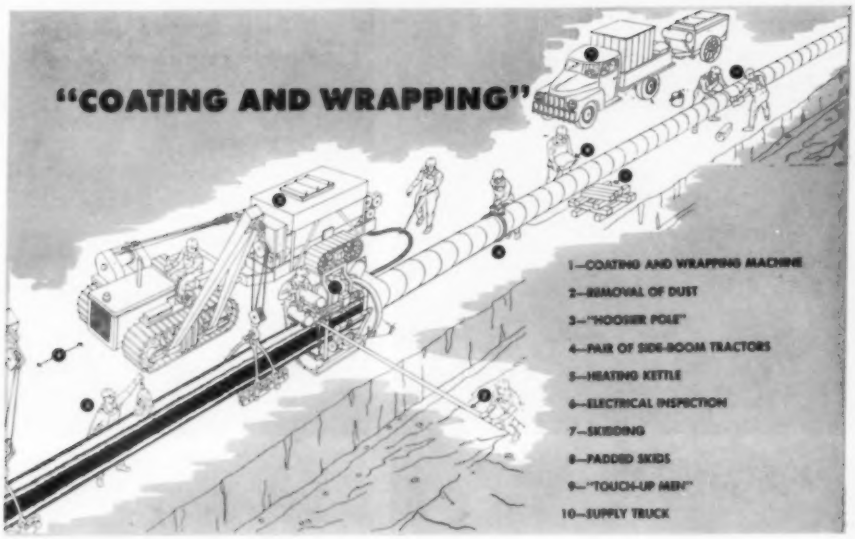
Contractors' Prices

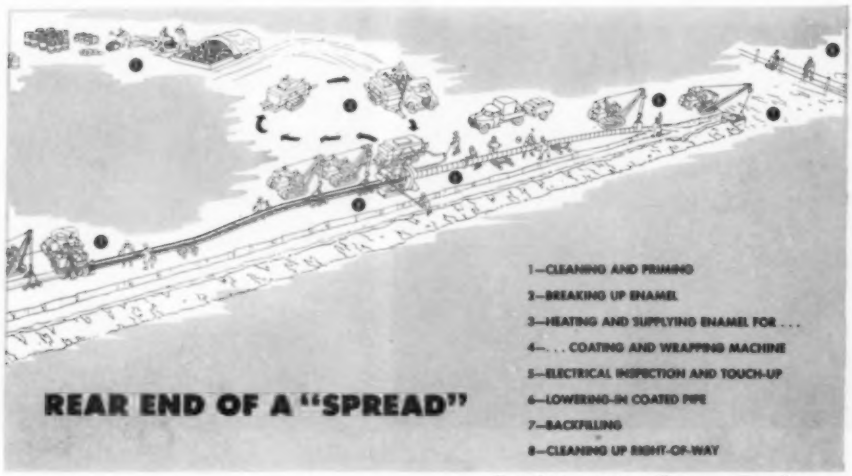
In 1952, a big-inch pipeline spread cost

$1,300,000

In 1957 it cost

$2,100,000




REAR END OF A "SPREAD"
1—CLEANING AND PRIMING
2—BREAKING UP ENAMEL
3—HEATING AND SUPPLYING ENAMEL FOR . . .
4—. . . COATING AND WRAPPING MACHINE
5—ELECTRICAL INSPECTION AND TOUCH-UP
6—LOWERING-IN COATED PIPE
7—BACKFILLING
8—CLEANING UP RIGHT-OF-WAY

Drawings courtesy Koppers Co., Inc.

In 1952, pipeline labor cost

$1.53-$2.73 an hour

In 1957 it cost

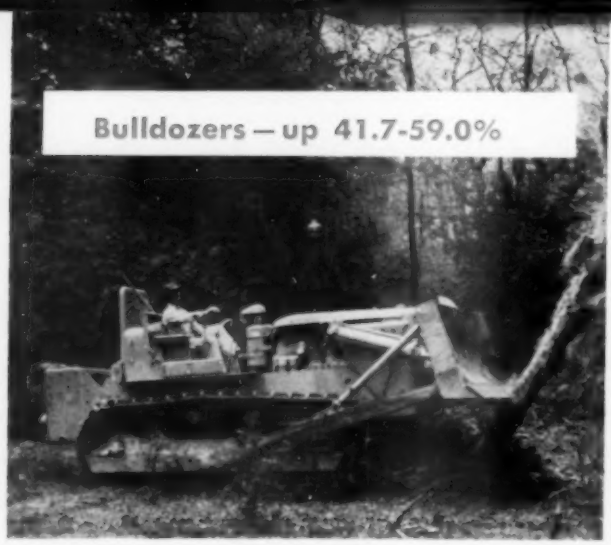
$1.98-$3.41 an hour

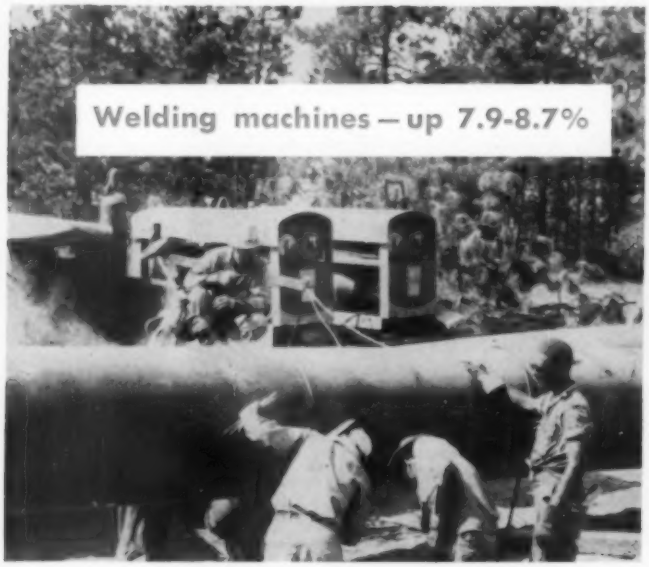
In 1952, contractors were paid (average of 20-30 in.)

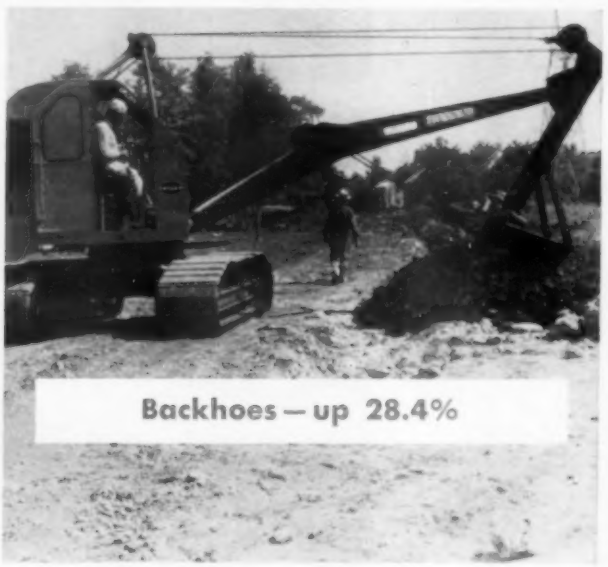
$2.45 per foot

In 1957 they were paid

$2.72 per foot



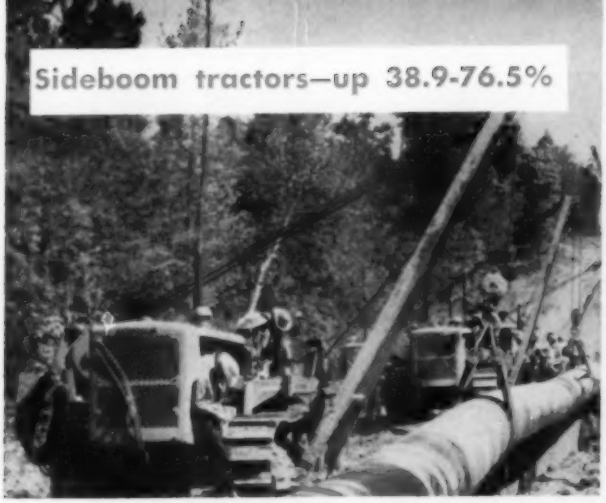


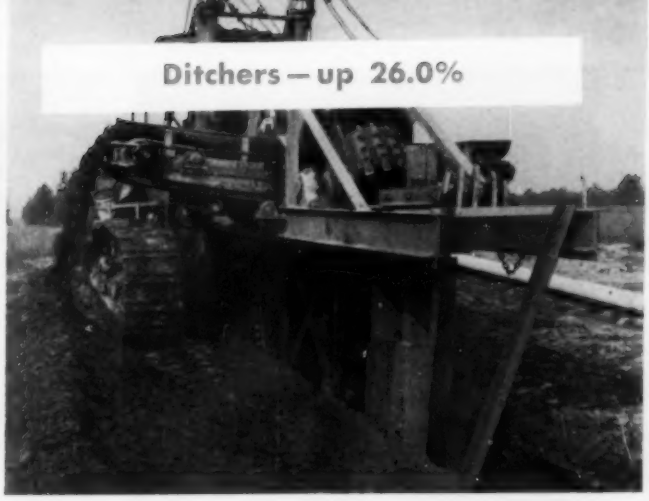


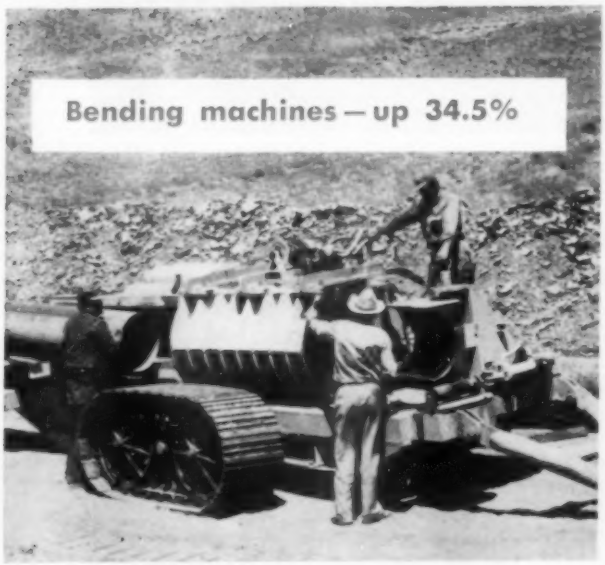
How major-equipment costs

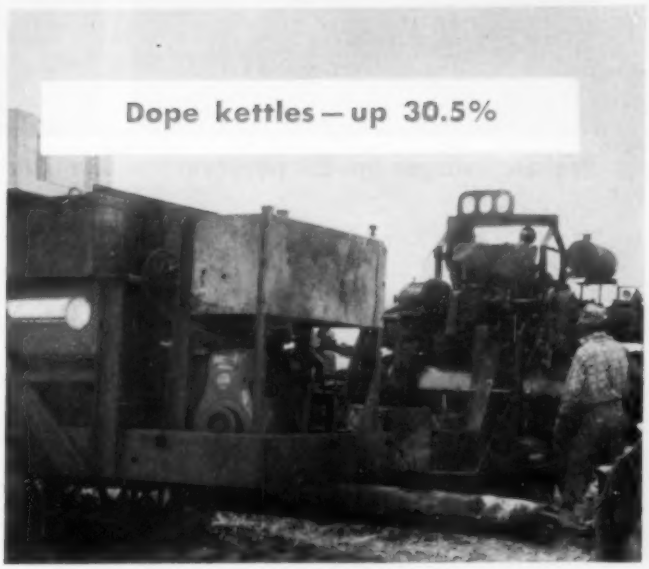
Here are some specific cost comparisons

	1952	1957
Heavy trucks (5-ton)	$ 7,233	$ 8,509
Heavy trucks (fully equipped)	8,200	10,000
Bulldozers:		
Model A	20,000	31,800
Model B	23,750	33,900
Model C	15,267	21,630
Sideboom tractors:		
Model A	24,668	43,550
Model B	16,887	24,230
Model C	28,225	39,200
Ditchers	32,403	40,820
Welding machines:		
Model A	799	862
Model B	1,116	1,213
Backhoes	12,739	16,361
Air compressors	9,235	11,100
Bending machines	8,920	12,000
Dope kettles	5,745	7,500
Cleaning and priming machines	8,000	9,675
Coating and wrapping machines	8,500	9,350









have risen in past 5 years

How monthly equipment rentals increased

	1952	1957	Per cent increase
Ditchers	$2,000	$2,500	25.0
Bulldozers:			
Model A	1,500	1,850	23.3
Model B	1,000	1,200	20.0
Sideboom tractors:			
Model A	1,400	1,750	25.0
Model B	1,000	1,200	20.0
Backhoes:			
Model A	2,000	2,500	25.0
Model B	1,200	1,500	25.0
Cleaning and priming machines (per mile)	118	145	22.2
Bending machines	1,500	1,300	*13.3

*Represents the only decrease listed.

Welding wages up 25 per cent

. . . Principal operators' wages up 20 per cent

Labor costs UP UP UP . . .

LABOR COSTS have followed the pattern of equipment and machinery: Wages are up sharply over 1952, from 20 to 25 per cent, in the United States, for the three main labor categories. Welders' helpers, oilers, apprentice operators, truck drivers, and certain highly skilled personnel are up proportionately. The increase would have been much greater had 1951 been used as the base year because the 1952 levels include substantial boosts won by the union.

The average wages shown are based on 15 selected states. They represent all sections of the country. Three are in the East, three in the North, one in the Midwest, three in the Southwest, three in the South, and two in the West. All are the scene of considerable construction activity. According to the Pipe Line Contractors Association, this selection presents the pattern of rate increases for the nation as a whole.

As the state breakdown points out, rates vary all over the map. There are extremes of small increases and large increases. In the South and Southwest, for example, principal operators today are paid only 6 per cent more than they were 5 years ago. In these areas the contractors' association for over 2 years was negotiating with the union for a new contract. Consequently operators' rates in these states did not increase in the same proportion as the other classifications. At the other end of the scale, common labor has gone up 47 per cent in Pennsylvania, 40 per cent in Ohio, and 53 per cent in Michigan. Principal operators in California are paid 49 per cent more than in 1952. Their scale has reached $4.16 an hour, highest for any state shown. California, a strongly organized state, tops all others in all wage categories. But the pattern in all states moves in the same direction: up.

Canadian wage rates are listed because of the high level of construction activity there in recent years and the important role that American contractors have played in dominion projects. The year 1954 is used as a base rather than 1952 because 1954 is the first year that the Pipe Line Contractors' Association of Canada negoitated pipeline rates. While Canadian labor is generally cheaper, wages are increasing at the same steady rate that they are in the United States.

Labor Supply, Stability

Stepped-up construction in postwar years has led to a greatly increased demand for pipeline labor. Increased activity along with the trend in other industries has added to the pressure for higher wages. The larger volume of work has placed a strain on the supply of skilled laborers. There are shortages in some instances. Obtaining enough welders in particular was a problem during the past year. To increase the supply of these key workers, the contractors' association this year organized a training school through the University of Texas extension service.

Along with the trend toward higher wages has come a new era of labor peace which has been most beneficial to the industry. In fact, there has not been a single major strike on a pipeline job in recent years. This is perhaps the greatest single accomplishment of the contractors association.

Common labor up 21 per cent

Average Labor Costs in U. S.

	1952	1957	% Inc.
Common laborer	$1.53	$1.98	20.9
Welder	2.73	3.41	24.9
Principal operator	2.62	3.15	20.2

. . . and in Canada

	1954	1957	% Inc.
Common laborer	$1.07	$1.28	19.6
Welder	2.80	3.30	17.9
Principal operator	2.36	2.56	8.5

Here are the dollar facts

That's the story since '52

Here's the 15-state breakdown

NEW YORK

Classification—	1952	1957	% inc.
Common labor	1.81	2.38	32
Welders	2.90	3.50	21
Principal operators	2.67	3.40	27

PENNSYLVANIA

Common labor	1.39	2.04	47
Welders	2.90	3.50	21
Principal operators	2.95	3.44	17

WEST VIRGINIA

Common labor	1.42	1.75	23
Welders	2.65	3.30	25
Principal operators	2.45	3.07	25

KENTUCKY

Common labor	1.46	1.80	23
Welders	2.65	3.30	25
Principal operators	2.50	3.30	32

LOUISIANA

Common labor	1.10	1.30	18
Welders	2.65	3.30	25
Principal operators	2.40	2.55	6

ALABAMA

Common labor	1.07½	1.25	12
Welders	2.65	3.25	23
Principal operators	2.40	2.55	6

ILLINOIS

Common labor	1.87	2.57	37
Welders	2.77½	3.60	30
Principal operators	2.70	3.37	25

OHIO

Classification—	1952	1957	% inc.
Common labor	1.75	2.45	40
Welders	2.77½	3.50	26
Principal operators	2.85	3.50	23

MICHIGAN

Common labor	1.41	2.16	53
Welders	2.77½	3.50	26
Principal operators	2.60	3.34	28

KANSAS

Common labor	1.55	1.73	12
Welders	2.65	3.30	25
Principal operators	2.40	2.55	6

NEW MEXICO

Common labor	1.30	1.65	27
Welders	2.65	3.25	23
Principal operators	2.50	2.67½	7

ARIZONA

Common labor	1.82½	2.27	24
Welders	2.65	3.25	23
Principal operators	2.60	3.30	27

TEXAS

Common labor	1.10	1.30	18
Welders	2.65	3.30	25
Principal operators	2.40	2.55	6

CALIFORNIA

Common labor	1.90	2.60	37
Welders	2.77½	3.70	33
Principal operators	2.80	4.16	49

WASHINGTON

Classification—	1952	1957	% inc.
Common labor	1.98	2.50	26
Welders	2.77½	3.57	29
Principal operators	3.01	3.44	14

...and the Canadian

BRITISH COLUMBIA

Common labor	1.20	1.55	29
Welders	2.80	3.30	18
Principal operators	2.40	2.73	14

ALBERTA

Common labor	1.20	1.35	12
Welders	2.80	3.30	18
Principal operators	2.35	2.50	6

SASKATCHEWAN

Common labor	1.00	1.20	20
Welders	2.80	3.30	18
Principal operators	2.35	2.50	6

ONTARIO

Common labor	1.00	1.30	30
Welders	2.80	3.30	18
Principal operators	2.35	2.60	11

MANITOBA

Common labor	1.00	1.10	10
Welders	2.80	3.30	18
Principal operators	2.35	2.50	6

Source: Pipe Line Contractors Association.

Estimated Pipeline Costs in Mid-Continent Area

	PIPE	2"	3"	4"	6"	8"
1.	Weight - #Per Foot	3.75	7.70	10.79	17.02	24.70
2.	Wall Thickness in Inches	.154	.216	.237	.250	.277
3.	Mill Cost Per Ton	125.00	124.00	130.00	123.00	119.00
4.	Tons Per Mile	9.90	20.33	28.49	44.93	65.21
5.	Mill Cost Per Foot	.234	.477	.701	1.047	1.470
6.	Freight (To Drumright/Ft.)	.054	.112	.157	.212	.307
7.	Total Cost of Pipe Per Foot	.288	.589	.858	1.259	1.777
	COMPANY COSTS					
8.	Coating Material	---	---	---	.072	.094
9.	Miscellaneous Fittings	---	---	.041	.056	.066
10.	Sales Tax @ 2% (5/8/9)	.005	010	.015	.024	.033
11.	Purch. Exp. @ 3% (5/8/9/10)	.007	.015	.023	.036	.050
12.	Right-of-Way	.060	.060	.060	.090	.090
13.	Right-of-Way Damages	.060	.060	.060	.090	.090
14.	Engineering & Survey	.025	.025	.025	.060	.060
15.	Insp., Test, & Supervision	.020	.020	.020	.030	.030
16.	Total Company Cost Per Foot	.177	.190	.244	.458	.513
	CONTRACT COSTS					
17.	Unload, Haul, & String (50¢/cwt)	.019	.038	.054	.085	.123
18.	Construction	.170	.200	.320	.500	.700
19.	Construction Extras	.040	.040	.100	.220	.220
20.	Total Contract Cost Per Foot	.229	.278	.474	.805	1.043
	SUMMARY					
21.	Cost of Pipe/Ft.	.288	.589	.858	1.259	1.777
22.	Company Cost/Ft.	.177	.190	.244	.458	.513
23.	Contract Cost/Ft.	.229	.278	.474	.805	1.043
24.	Total Cost/Ft.	.694	1.057	1.576	2.522	3.333
25.	Total Cost/Mile	$3664	$5581	$8321	$13316	$17598

Contractor's Share

Pipeline contract prices are up . . .

IT IS THE BOAST of pipeline contractors that the best bargain in the industry is a foot of pipe laid by a contractor. Can this statement stand up under a full examination of all the facts?

Certainly the contractor can claim his share of credit for holding down the costs of building a pipeline the past 5 years. His claim is supported by the records of the companies for which he works. Company cost figures show that the contractor's share of the total outlay for a pipeline project is 19 to 25 per cent, depending on the diameter. Since 1952, this percentage has generally declined. This trend is true for 8 of the 13 diameters which account for the great bulk of pipeline mileage laid every year in gathering and transmission lines. The contractor's share of the total pipeline cost was down as much as 3 per cent. In one case the amount paid the contractor remained the same proportionately. For the remaining four diameters the contractor's price in 1957 was a greater percentage of the total than in 1952.

The 1952-57 Price Trend

The modest extent to which contractor's prices have risen can be seen by comparing 1952 figures on these pages with the 1957 table which follows. These prices were based on actual company experience and company

for 1952—Various Pipe Diameters

10"	12"	14"	16"	18"	20"	22"	24"	26"	30"
31.20	37.45	45.68	52.36	59.03	65.71	79.51	94.62	102.63	118.48
.279	.281	.312	.312	.312	.312	.344	.375	.375	.375
122.00	124.00	124.00	125.00	126.00	126.00	127.00	127.00	127.00	139.00
82.37	98.87	120.59	138.23	155.84	173.47	209.91	249.80	270.94	312.79
1.903	2.322	2.832	3.272	3.719	4.140	5.049	6.008	6.517	8.234
.388	.466	.568	.652	.735	.817	.989	1.177	1.187	1.086
2.291	2.788	3.400	3.924	4.454	4.957	6.038	7.185	7.704	9.320
.114	.140	.153	.172	.195	.216	.239	.268	.281	.324
.074	.085	.097	.109	.133	.155	.181	.212	.244	.277
.042	.051	.062	.071	.081	.090	.109	.130	.141	.177
.064	.078	.094	.109	.124	.138	.167	.199	.215	.270
.090	.120	.120	.120	.120	.120	.120	.120	.120	.120
.090	.120	.120	.120	.120	.120	.120	.120	.120	.120
.060	.060	.070	.070	.070	.070	.070	.070	.070	.070
.050	.050	.050	.050	.050	.050	.050	.050	.050	.050
.584	.704	.766	.821	.893	.959	1.056	1.169	1.241	1.408
.156	.187	.228	.262	.295	.329	.398	.473	.513	.592
.950	1.200	1.400	1.700	2.000	2.200	2.350	2.500	2.600	2.800
.260	.260	260	.330	.330	.330	.330	.330	.330	.330
1.366	1.647	1.888	2.292	2.625	2.859	3.078	3.303	3.443	3.722
2.291	2.788	3.400	3.924	4.454	4.957	6.038	7.185	7.704	9.320
.584	.704	.766	.821	.893	.959	1.056	1.169	1.241	1.408
1.366	1.647	1.888	2.292	2.625	2.859	3.078	3.303	3.443	3.722
4.241	5.139	6.054	7.037	7.972	8.775	10.172	11.657	12.388	14.450
$22392	$27134	$31965	$37155	$42092	$46332	$53708	$61549	$65409	$76296

but only modestly

estimates which are guides to budgeting projects. Average contract prices are up about 12 per cent from 1952.

Some contractors dispute the 12 per cent increase. They point to actual contracts under which they built a loop line last year for less than the original project was contracted in 1952. But regardless whether prices are up 12 per cent, or some smaller figure, contractors can still make a strong case for their position that they have failed to recover the increased costs experienced since 1952.

Contractors' general appraisal of 1957 is: high volume, low profit. There was plenty of work, principally in gas-transmission lines, but there were more than enough spreads available to handle it. So 1957 is not going into the record books as one of the better years for pipeline contractors. Specific projects supporting this theme will be presented later in the report. The high-volume, low-profit tag applies even to the dozen contractors who win the bulk of the big-money contracts. These are in the main the 30-in. jobs where the experience of leading contractors and financing required for multimillion-dollar projects weed out much competition.

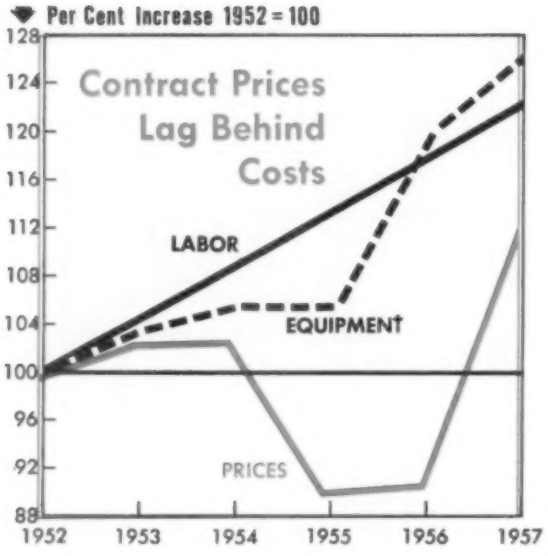
(For a picture of what's happened since 1952, turn the page.)

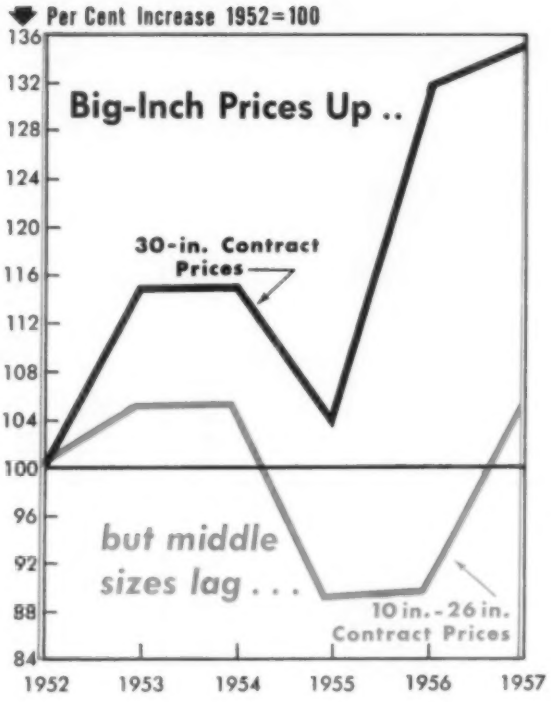
Estimated Pipeline Costs in Mid-Continent

PIPE SIZE	WT./FT. PLAIN END LBS.	WALL THICKNESS INS.	TONS PER MILE	FREIGHT TO DR'TE $/FT.	COST OF PIPE - $/FOOT				COMPANY COST - $/FOOT				
					GRADE B	GRADE X-42	GRADE X-46	GRADE X-52	COATING MATL.	MISCL. COSTS	R/W & DAMAGES	ENGR. & INSPECT	TOTAL
4"	8.64	.188	22.81	.090	.907	-	-	-	-	.045	.200	.045	.290
	10.79	.237	28.49	.112	1.099	-	-	-	-	"	"	"	"
6"	12.89	.188	34.03	.152	1.439	1.452	1.466	1.479	.095	.066	.200	.090	.451
	14.97	.219	39.52	.176	1.634	1.650	1.666	1.682	"	"	"	"	"
	17.02	.250	44.93	.200	1.824	1.842	1.860	1.878	"	"	"	"	"
	18.97	.280	50.08	.223	1.998	2.017	2.037	2.057	"	"	"	"	"
	21.07	.312	55.62	.249	2.211	2.234	2.256	2.278	"	"	"	"	"
8"	16.90	.188	44.62	.199	1.854	1.872	1.890	1.907	.124	.077	.200	.100	.501
	19.64	.219	51.85	.231	2.109	2.129	2.150	2.170	"	"	"	"	"
	22.36	.250	59.03	.263	2.353	2.377	2.400	2.423	"	"	"	"	"
	24.70	.277	65.21	.292	2.582	2.608	2.635	2.661	"	"	"	"	"
	27.74	.312	73.23	.327	2.835	2.865	2.894	2.923	"	"	"	"	"
	28.55	.322	75.37	.337	2.893	2.922	2.953	2.983	"	"	"	"	"
10"	24.60	.219	64.94	.289	2.698	2.724	2.749	2.775	.152	.087	.340	.100	.679
	28.04	.250	74.03	.330	3.020	3.050	3.079	3.108	"	"	"	"	"
	31.20	.279	82.37	.367	3.332	3.366	3.399	3.433	"	"	"	"	"
	34.24	.307	90.39	.404	3.601	3.638	3.675	3.712	"	"	"	"	"
	38.20	.344	100.85	.450	3.950	3.990	4.029	4.070	"	"	"	"	"
	40.48	.365	106.87	.477	4.111	4.154	4.197	4.240	"	"	"	"	"
12"	29.28	.219	77.30	.345	3.311	3.342	3.373	3.404	.183	.101	.340	.100	.724
	33.38	.250	88.12	.393	3.732	3.767	3.802	3.837	"	"	"	"	"
	37.45	.281	98.87	.441	4.113	4.152	4.192	4.230	"	"	"	"	"
	41.51	.312	109.59	.490	4.521	4.564	4.608	4.651	"	"	"	"	"
	43.77	.330	115.55	.516	4.733	4.780	4.827	4.875	"	"	"	"	"
	45.55	.344	120.25	.537	4.848	4.897	4.944	4.992	"	"	"	"	"
	49.56	.375	130.84	.584	5.202	5.255	5.309	5.362	"	"	"	"	"
	57.53	.438	151.88	.678	6.006	6.067	6.126	6.187	"	"	"	"	"
14"	36.71	.250	96.91	.404	4.045	4.084	4.123	4.161	.202	.114	.340	.120	.776
	41.21	.281	108.79	.453	4.498	4.541	4.585	4.628	"	"	"	"	"
	45.68	.312	120.60	.502	4.883	4.931	4.979	5.026	"	"	"	"	"
	50.14	.344	132.37	.551	5.312	5.364	5.417	5.469	"	"	"	"	"
	54.57	.375	144.06	.600	5.579	5.636	5.694	5.750	"	"	"	"	"
	63.37	.438	167.30	.696	6.478	6.545	6.612	6.678	"	"	"	"	"
16"	42.05	.250	111.01	.462	4.652	4.696	4.740	4.784	.230	.129	.400	.120	.879
	47.22	.281	124.66	.519	5.178	5.227	5.277	5.326	"	"	"	"	"
	52.36	.312	138.23	.575	5.628	5.682	5.737	5.792	"	"	"	"	"
	57.48	.344	151.75	.631	6.115	6.176	6.236	6.297	"	"	"	"	"
	62.58	.375	165.21	.688	6.430	6.496	6.562	6.627	"	"	"	"	"
	72.72	.438	191.98	.799	7.478	7.555	7.631	7.707	"	"	"	"	"
18"	47.39	.250	125.11	.623	5.366	5.415	5.466	5.515	.256	.157	.400	.130	.943
	53.22	.281	140.50	.585	5.863	5.920	5.976	6.031	"	"	"	"	"
	59.03	.312	155.84	.649	6.380	6.442	6.504	6.566	"	"	"	"	"
	64.82	.344	171.12	.713	6.938	7.007	7.075	7.143	"	"	"	"	"
	70.59	.375	186.36	.776	7.290	7.365	7.438	7.513	"	"	"	"	"
	82.06	.438	216.64	.902	8.479	8.565	8.651	8.737	"	"	"	"	"
20"	52.73	.250	139.21	.693	5.908	5.964	6.019	6.074	.258	.182	.400	.130	.970
	59.23	.281	156.37	.779	6.575	6.638	6.700	6.762	"	"	"	"	"
	65.71	.312	173.47	.722	7.017	7.086	7.155	7.224	"	"	"	"	"
	72.16	.344	190.50	.793	7.625	7.701	7.777	7.852	"	"	"	"	"
	78.60	.375	207.50	.864	8.024	8.106	8.189	8.271	"	"	"	"	"
	91.41	.438	241.32	1.004	9.329	9.425	9.522	9.617	"	"	"	"	"
22"	65.24	.281	172.23	.858	7.277	7.345	7.413	7.481	.284	.211	.400	.130	1.025
	72.38	.312	191.08	.952	7.918	7.993	8.069	8.145	"	"	"	"	"
	79.51	.344	209.91	.873	8.449	8.532	8.616	8.699	"	"	"	"	"
	86.61	.375	228.65	.952	8.886	8.976	9.067	9.159	"	"	"	"	"
	100.75	.438	265.98	1.107	10.332	10.438	10.543	10.649	"	"	"	"	"
24"	71.25	.281	188.10	.936	7.907	7.983	8.057	8.132	.312	.246	.400	.130	1.088
	79.06	.312	208.72	.869	8.356	8.438	8.521	8.604	"	"	"	"	"
	86.85	.344	229.28	.955	9.089	9.181	9.272	9.362	"	"	"	"	"
	94.62	.375	249.80	1.040	9.558	9.657	9.756	9.856	"	"	"	"	"
	110.10	.438	290.66	1.210	11.123	11.239	11.354	11.470	"	"	"	"	"
26"	85.73	.312	226.33	1.126	9.045	9.134	9.225	9.315	.338	.265	.400	.130	1.133
	94.19	.344	248.66	1.035	9.631	9.730	9.829	9.927	"	"	"	"	"
	102.63	.375	270.94	1.128	10.123	10.232	10.339	10.447	"	"	"	"	"
	119.44	.438	315.32	1.312	11.781	11.905	12.031	12.156	"	"	"	"	"
30"	118.65	.375	313.24	1.304	11.827	11.951	12.076	12.201	.392	.321	.400	.130	1.243
	128.40	.406	338.98	1.411	12.804	12.938	13.073	13.208	"	"	"	"	"
	138.13	.438	364.66	1.518	13.770	13.916	14.061	14.206	"	"	"	"	"
	157.53	.500	415.88	1.731	15.623	15.788	15.953	16.119	"	"	"	"	"

Area for 1957

CONTRACT COST – $/FOOT				TOTAL COST – $/FOOT				TOTAL COST – $/MILE			
UNLOAD HAUL STRING	CONSTR-UCTION	EXTRAS	TOTAL	GRADE B	GRADE X-42	GRADE X-46	GRADE X-52	GRADE B	GRADE X-42	GRADE X-46	GRADE X-52
.039	.420	.100	.559	1.756	-	-	-	9,272	-	-	-
.049	"	"	.569	1.958	-	-	-	10,338	-	-	-
.058	.650	.220	.928	2.818	2.831	2.845	2.858	14,879	14,948	15,022	15,090
.067	"	"	.937	3.022	3.038	3.054	3.070	15,956	16,041	16,125	16,210
.077	"	"	.947	3.222	3.240	3.258	3.276	17,012	17,107	17,202	17,297
.085	"	"	.955	3.404	3.423	3.443	3.463	17,973	18,073	18,179	18,285
.095	"	"	.965	3.627	3.650	3.672	3.694	19,151	19,272	19,388	19,504
.076	.850	.240	1.166	3.521	3.539	3.557	3.574	18,591	18,686	18,781	18,871
.088	"	"	1.178	3.788	3.808	3.829	3.849	20,001	20,106	20,217	20,323
.101	"	"	1.191	4.045	4.069	4.092	4.115	21,358	21,484	21,606	21,727
.111	"	"	1.201	4.284	4.310	4.337	4.363	22,620	22,757	22,899	23,037
.125	"	"	1.215	4.551	4.581	4.610	4.639	24,029	24,188	24,341	24,494
.128	"	"	1.218	4.612	4.641	4.672	4.702	24,351	24,504	24,668	24,827
.111	1.050	.260	1.421	4.798	4.824	4.849	4.875	25,333	25,471	25,603	25,740
.126	"	"	1.436	5.135	5.165	5.194	5.223	27,113	27,271	27,424	27,577
.140	"	"	1.450	5.461	5.495	5.528	5.562	28,834	29,014	29,188	29,367
.154	"	"	1.464	5.744	5.781	5.818	5.855	30,328	30,524	30,719	30,914
.172	"	"	1.482	6.111	6.151	6.190	6.231	32,266	32,477	32,683	32,900
.182	"	"	1.492	6.282	6.325	6.368	6.411	33,169	33,396	33,623	33,850
.132	1.300	.280	1.712	5.747	5.778	5.809	5.840	30,344	30,508	30,672	30,835
.150	"	"	1.730	6.186	6.221	6.256	6.291	32,662	32,847	33,032	33,216
.169	"	"	1.749	6.586	6.625	6.665	6.703	34,774	34,980	35,191	35,392
.187	"	"	1.767	7.012	7.055	7.099	7.142	37,023	37,250	37,483	37,710
.197	"	"	1.777	7.234	7.281	7.328	7.376	38,196	38,444	38,692	38,945
.205	"	"	1.785	7.357	7.406	7.453	7.501	38,845	39,104	39,352	39,605
.223	"	"	1.803	7.729	7.782	7.836	7.889	40,809	41,089	41,374	41,654
.259	"	"	1.839	8.569	8.630	8.689	8.750	45,244	45,566	45,878	46,200
.165	1.500	.300	1.965	6.786	6.825	6.864	6.902	35,830	36,036	36,242	36,443
.185	"	"	1.985	7.259	7.302	7.346	7.389	38,328	38,555	38,787	39,014
.206	"	"	2.006	7.665	7.713	7.761	7.808	40,471	40,725	40,978	41,226
.226	"	"	2.026	8.114	8.166	8.219	8.271	42,842	43,116	43,396	43,671
.246	"	"	2.046	8.401	8.458	8.516	8.572	44,357	44,658	44,964	45,260
.285	"	"	2.085	9.339	9.406	9.473	9.539	49,310	49,664	50,017	50,366
.189	1.750	.400	2.339	7.870	7.914	7.958	8.002	41,554	41,786	42,018	42,251
.212	"	"	2.362	8.419	8.468	8.518	8.567	44,452	44,711	44,975	45,234
.236	"	"	2.386	8.893	8.947	9.002	9.057	46,955	47,240	47,531	47,821
.259	"	"	2.409	9.403	9.464	9.524	9.585	49,648	49,970	50,287	50,609
.287	"	"	2.437	9.746	9.812	9.878	9.943	51,459	51,807	52,156	52,499
.327	"	"	2.477	10.834	10.911	10.987	11.063	57,204	57,610	58,011	58,413
.213	1.950	.420	2.583	8.892	8.941	8.992	9.041	46,950	47,208	47,478	47,736
.239	"	"	2.609	9.415	9.472	9.528	9.583	49,711	50,012	50,308	50,598
.266	"	"	2.636	9.959	10.021	10.083	10.145	52,584	52,911	53,238	53,566
.292	"	"	2.662	10.543	10.612	10.680	10.748	55,667	56,031	56,390	56,749
.318	"	"	2.688	10.921	10.996	11.069	11.144	57,663	58,059	58,444	58,840
.369	"	"	2.739	12.161	12.247	12.333	12.419	64,210	64,664	65,118	65,572
.237	2.150	.450	2.837	9.715	9.771	9.826	9.881	51,295	51,591	51,881	52,172
.267	"	"	2.867	10.412	10.475	10.537	10.599	54,975	55,308	55,635	55,963
.296	"	"	2.896	10.883	10.952	11.021	11.090	57,462	57,827	58,191	58,555
.325	"	"	2.925	11.520	11.596	11.672	11.747	60,826	61,227	61,628	62,024
.354	"	"	2.954	11.948	12.030	12.113	12.195	63,085	63,518	63,957	64,390
.411	"	"	3.011	13.310	13.406	13.503	13.598	70,277	70,784	71,296	71,797
.294	2.400	.450	3.144	11.446	11.514	11.582	11.650	60,435	60,794	61,153	61,512
.326	"	"	3.176	12.119	12.194	12.270	12.346	63,988	64,384	64,786	65,187
.358	"	"	3.208	12.682	12.765	12.849	12.932	66,961	67,399	67,843	68,281
.390	"	"	3.240	13.151	13.241	13.332	13.424	69,437	69,912	70,393	70,879
.453	"	"	3.303	14.660	14.766	14.871	14.977	77,405	77,964	78,519	79,079
.321	2.650	.480	3.451	12.446	12.522	12.596	12.671	65,715	66,116	66,507	66,903
.356	"	"	3.486	12.930	13.012	13.095	13.178	68,270	68,703	69,142	69,580
.391	"	"	3.521	13.698	13.790	13.881	13.971	72,325	72,811	73,292	73,767
.426	"	"	3.556	14.202	14.301	14.400	14.500	74,987	75,509	76,032	76,560
.495	"	"	3.625	15.836	15.952	16.067	16.183	83,614	84,227	84,834	85,446
.386	2.900	.480	3.766	13.944	14.033	14.124	14.214	73,624	74,094	74,575	75,050
.424	"	"	3.804	14.568	14.667	14.766	14.864	76,919	77,442	77,964	78,482
.462	"	"	3.842	15.098	15.207	15.314	15.422	79,717	80,293	80,858	81,428
.537	"	"	3.917	16.831	16.955	17.081	17.206	88,868	89,522	90,188	90,848
.534	3.500	.500	4.534	17.604	17.728	17.853	17.978	92,949	93,604	94,264	94,924
.578	"	"	4.578	18.625	18.759	18.894	19.029	98,340	99,048	99,760	100,473
.622	"	"	4.622	19.635	19.781	19.926	20.071	103,673	104,444	105,209	105,975
.709	"	"	4.709	21.575	21.740	21.905	22.071	113,916	114,787	115,658	116,535





How and why prices have not

THE EXTENT to which contractors' prices have lagged behind equipment and machinery and labor costs is illustrated in the first graph. While average contract prices are shown to be up 12 per cent from 1952, labor is up 22 per cent and equipment and machinery 26 per cent.

The sudden cutback in contractors' prices in 1955 points out conclusively the competitive nature of pipelining, its vagaries, and its risks. Contractors' costs continued upward in that year. Construction held at a high level. What, then, made the bottom drop out of prices?

The answer lies in a combination of factors. The construction was late starting. Work did not open up as early as usual. When projects did jell, contractors were so eager to get their men and equipment busy that they bid low. The deflated price situation prevailed for the full construction season. The next year, contractors found themselves unable to get prices back up, even though there was a sharp increase in wages and equipment and machinery. There was some recovery, according to pipeline companies, in 1957. But the contractors say that their balance sheets do not coincide with the upturn shown on the graph.

The chart comparing 1957 prices with 1952 tells a mixed story. The increase in prices ranges up to almost 35 per cent for 30-in., according to company figures. The smaller-diameter prices also increased substantially. The improvement in prices for laying smaller pipe occurred during the past year after they had languished for 4 years at either the same level or below 1952. The intermediate diameters, 10 to 26-in., however, show very modest increases. Two diameters—18 and 20-in.—actually were contracted for less than in 1952.

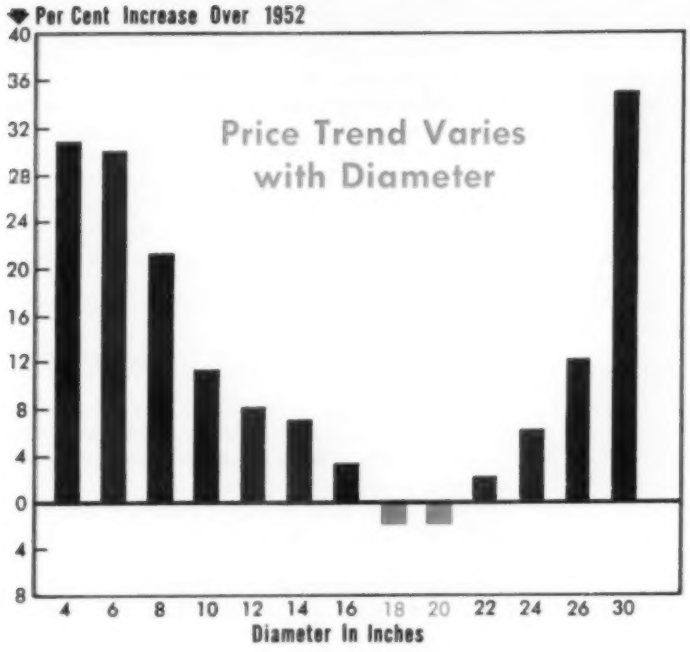
Price Variation by Diameter

Why such a widely differing price trend? Competition is the best explanation for this puzzling pattern. Contractors who handle a large volume of little-inch work often concentrate in a limited area. They are "local" contractors. They can get a good price for a job and still underbid a contractor who has to move in equipment any great distance.

Some of the smaller contractors make a good thing out of gathering-system work in a newly opened oil or gas area. They can get a contract to connect new wells and keep working during most of the construction season as new wells are completed. A contractor who by doing good work at a fair price wins the confidence and good will of a particular company is sometimes able to work almost full time for that company.

It is in the intermediate diameters that competition is fiercest. There are more contractors for this work than any other. The inevitable result is a low price, so long as the number of spreads is greater than the demand.

The blue-chip work is unquestionably in 30-in. and above. (There is no comparison for diameters above 30-in. because they were not in common use in 1952). With so much at stake in these large projects there is less tendency toward penny pinching by



Comparative prices look favorable for the big-inch contractor. But some 1957 jobs were let at prices only slightly above 1952, and some were let for less.

kept pace with costs

the company awarding the contract. It is to the company's advantage to make the award to a responsible, competent contractor at a price which will permit him to do the best possible job and still make a profit.

If there is anything to be learned from figures, it is perhaps that the best chance to make money is in little-inch and big-inch work. In between the contractor competes against almost everyone in the business.

Pipeliners in this respect are in a situation similar to the drilling contractor. Both industries have an oversupply of equipment. This is fine for the operating company but tough for the contractor. The condition exists generally throughout the two industries. But the analogy can be carried still further. Like the pipeline contractor with an intermediate-diameter spread, it is the drilling contractor with medium-depth rigs who has the most trouble keeping his equipment working at a profitable rate. And it is the heavy rigs capable of drilling deep holes, like the big-inch spreads, which are earning the best return on investment.

The strong position of the big-inch pipeline builders is well illustrated by industry experience in 1956. While most contractors continued to work for depressed prices through 1956, those with 30-in. spreads more than recovered the 1955 loss.

Actual Bids Show Trend

It would be a mistake to assume that the big-inch contractors have a bonanza or operate from a sheltered position, however. While the comparative figures look favorable for them, the relation of price and cost indexes is only part of the story. In the first place, many jobs are let for little more than similar work in 1952. Some are let for less.

Contractors interviewed by the Journal were in very close agreement as to revenues received for comparable work. The range was from 10 per cent less than 1952 to 20 per cent more. The bulk of specific jobs analyzed showed that last year contractors received 6 to 8 per cent more for big-inch work than they did in 1952. Comparisons were confined to loop lines or new lines in the same area with similar laying conditions. These same contractors reported increased costs of 24.6 to 40 per cent.

Some specific projects will illustrate the situation. Six years ago a 30-in. project was contracted for $3.80 per foot. Last year, a similar job for the same company went for $4.10 per foot. The 1957 price was only 8 per cent higher. And the first job broke the contractor.

Similar examples can be found in the intermediate diameters. In 1947 a 16-in. job in the Midwest was contracted for $1.75 per foot. In 1957 a 20-in. line for the same company brought $1.90. This was only 8 per cent more than was received for the smaller-diameter line 10 years before.

In 1948 a 20-in. job went for $3 per foot. Nine years later, a 24-in. job in the same area under the same laying conditions was let for $2.25, which was 25 per cent less for heavier pipe. In this same pipe-diameter range another 1957 job was let for 6 per cent less than 1952 work for the same company along the same right-of-way.

"Contractors are urging a realistic look at their costs."

These case histories are not presented as typical of the entire pipeline-contracting picture. Neither are they isolated examples which are contrary to the general trend. They are sufficiently widespread to be representative of a sizable segment of the industry.

Spreads Are Bigger, More Powerful

In the face of this cost-price squeeze, how have contractors been able to operate successfully? Contractors today are turning out more work at the same or slightly higher prices. The reason can be found in the changed character of the spread.

As it is difficult to define a typical spread, so it is difficult to determine average investment in a spread. Variations in terrain, and the special or extra equipment required for some jobs, may result in a difference of as much as 50 per cent in the investment of two spreads organized to lay the same size pipe.

Contractors polled by the Journal on their investment in a normal 30-in. spread gave estimates which varied by $200,000 in 1952 and $700,000 in 1957. In 1952 contractors estimated a typical big-inch spread cost around $1,300,000. In 1957 a typical spread represented an investment of $2,100,000, an increase of more than 60 per cent. Equipment costs did not increase to that extent. The typical spread has changed. If you priced the exact equipment that represented $2,100,000 in 1957, it would have cost $1,700,000 in 1952. The explanation is that the 1952 spread didn't pack the punch that the current spread does. The current spread is bigger, more powerful, can do more work more efficiently.

Hefty sideboom tractors which didn't exist in 1952 are working on today's spreads. Models which were used in 1952 are greatly improved. Some are the same machine basically but with beefed-up accessories. Others with the same basic capacity have been modified to increase efficiency. Improved equipment has meant generally faster, more consistent progress which has partially offset higher costs.

But has increased efficiency enabled contractors to bridge the gap between higher costs and lagging prices? Their answer is supplied by an appraisal of 1957 heard widely in the industry: It was a big year in volume of business but one of doubtful profit.

Postwar Changes

The position of the contractor has changed in the postwar period. Until about 15 years ago the oil companies were the big pipeline builders. Contractors were regarded as a component institution in pipelining. For the growth of the pipeline industry, it was considered essential to have a prosperous contracting industry. If a bad bid got a contractor in trouble financially, he would often be bailed out of the jam.

Then came the boom in crosscountry gas lines. Since World War II pipelining has been dominated by gas-transmission companies. Many have the utility point of view. Price consciousness increased and interest in the contractor's health decreased, first among gas companies and later to a certain extent among the oil pipelines.

The new attitude, combined with an increased number of contractors in the business, helped to drive prices down. It is opening the way for the shoestring contractor who can rent a whole spread on credit from a supplier. If he loses money, the supplier can foreclose his mortgage. The fringe contractors operating on credit generally bid low. Whether they win a contract or not, they influence the price at which it is let, even when the contract is negotiated with a higher bidder.

Two points of view have become current among pipeline companies:

- Contractors got too much 5 years ago. They grew complacent.
- With increased competition, contractors have been stimulated to greater efficiency and faster rates of progress, which give the contractor adequate profit at relatively lower contract prices.

The contractor finds it hard to accept either thesis 100 per cent. There is no doubt that competition has contributed to efficiency and speed. But the contractor must question the adequacy of current profits to provide for depreciation and a reasonable return on investment.

With the high level of construction and the change of pipeline contracting to a high-volume business have come greater risks. They are inherent in the handling of more contracts per year on a narrow margin of possible profit. Furthermore, pipeline construction has never been and can never be an exact science. Exact costs are difficult if not impossible to predict. Total costs which are within 5 per cent of estimates are the exception rather than the rule.

Laying of larger-diameter, heavier pipe in congested areas requires more care for the sake of safety. Closer inspection has increased laying costs. With this larger job has come greater responsibility. Pipeline companies have to rely heavily on contractor personnel because complete inspection by company personnel would require an inspector with each man who touches the pipe.

What Contractors Propose

Contractors are urging themselves to look at their own costs more realistically. Bids frequently appear to be based on costs and prices several years ago. One suggestion heard from contractors is an increase of 10 per cent in their prices which would increase by about 2½ per cent the total cost of building a pipeline. They believe the boost would be justified in assurance of safety.

They are trying to sell the idea that selection of competent bidders is advantageous to the pipeline companies. Bids of competent contractors should be expected to come within 5 per cent of each other. An extremely low bid, one which is well outside the cluster of bids by responsible contractors, should be regarded with suspicion. It sometimes is, too, as evidenced by the fact that the low bidder does not always get the job. It is this attitude which contractors would like to encourage. They see their future as hinging upon a soul searching among their own number, a harder look at their own costs, and a sympathetic policy on the part of companies to remove the fringe contractor as a club with which to hammer down prices.

DIRECTORY OF PIPELINE CONTRACTORS

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A

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Abbott Contractors, Inc., 3349 South Kedzie Avenue, Chicago.

Earl Allen Construction Co., 3115 Buffalo Drive, Houston.

Altgelt Construction Co., Inc., Box 1402, Corpus Christi, Tex.

Apache Contractors, Inc., 318 Constantine Building, Tulsa.

Arey Construction Co., Box 1501, Pampa, Tex.

Associated Pipe Line Contractors, Inc., Box 13216, Houston.

B

C. P. Bartley & Son, Box 616, Tioga, N. D.

Baughman Contracting Co., Inc., Rt. 1, Box 569, Cumberland, Md.

Bechtel Corp., 220 Bush Street, San Francisco.

Harry Bennett Construction Co., Alma, Ga.

Benson & Montin Construction Co., 2808 First National Building, Oklahoma City.

Berry Construction Co., New Hebron, Miss.

Bills Construction Co., 1748 East Thirteenth Place, Tulsa.

Booth & Flinn Co., 1942 Forbes Street, Pittsburgh.

Britton Engineering & Construction Co., Dan Waggoner Building, Fort Worth.

Brodie Construction Co., 764 North Grand, Amarillo, Tex.

Brown & Root, Inc., Box 3, Houston.

O. R. Burden Construction Corp., 6702 East Twenty-first Street, Tulsa.

Buttram Pipe Line Construction Co., Box 744, Ponca City, Okla.

C

Cape Construction Co., Box 423, Cape Girardeau, Mo.

Sam Carline, Inc., Box 138, Berwick, La.

J. E. Carlson Construction, Inc., Box 1179, Pampa, Tex.

C. P. Carter Construction Co., Box 928, Duncan, Okla.

Chambliss-Kirksey, Inc., Box 289, Sweeny, Tex.

Cheek Construction Co., Box 462, Ulysses, Kans.

Cimarron Engineering Construction Co., Inc., Box 4804, Oklahoma City.

W. E. Claycomb & Son Construction Co., Rt. 1, Cody, Wyo.

Collins Construction Co., Box 86, Port Lavaca, Tex.

Colorado-Wyoming Construction Co., Box 357, Loveland, Colo.

Conner Construction Co., Box 1047, Odessa, Tex.

Continental Construction Co., Box 53, Big Spring, Tex.

Contractors, Inc., Box 422, Marshalltown, Iowa.

Conyes Construction Corp., Box 6, San Pablo, Calif.

R. L. Coolsaet Construction Co., 7600 Middlesex, Dearborn, Mich.

A. J. Curtis Construction Co., 301 S. Wolcott, Casper, Wyo.

D

D. B. S. Pipeline Construction Corp., 1510 Fox Avenue, Dumas, Tex.

E

Eastern Pipeline Contractors, 820 Mercantile Bank Building, Dallas.

Engineering-Construction Co., First National Building, Tulsa.

Engineers Limited Pipeline Co., 200 Bush Street, San Francisco.

F

John D. Fahey & Son, Inc., First National Bank Building, Waynesburg, Pa.

L. E. Farley, Inc., Box 6841, Houston.

Fish Service Corp., M. & M. Building, Houston.

Foran Construction Co., Box 1865, Amarillo, Tex.

Four Way Co., Inc., Box 695, Aztec, N. M.

Foutz & Bursum Construction Co., Box 307, Farmington, N. M.

Fowler-Tatom Pipeline Contractor, Inc., Box 368, Cotton Valley, La.

Fulghum Contracting Corp., Box 1181, Harrisburg, Pa.

Fulton & Brodie, Inc., Box 1526, Lubbock, Tex., and Box 2064, Amarillo, Tex.

R. H. Fulton & Co., Box 1526, Lubbock, Tex.

G

G.E.T. Construction, Inc., 435 S. 116th Street, Milwaukee.

Gaasch Construction Co., Box 386, Brownfield, Tex.

Samuel Gallucci & Sons, Inc., 102-11 44th Avenue, Corona, L. I., N. Y.

General Construction Co., Clendenin, W. Va.

H. L. Gentry Construction Co., 921 E. Michigan Avenue, Jackson, Mich.

Gilmore Construction Co., Box 325, Hays, Kans.

Glaser Construction Co., Box 1387, Lafayette, La.

Goldenstern & Stolper, Inc., Box 687, Ponca City, Okla.

Golightly Construction Corp., Box 15243, Houston.

Gray-Morrison Contractors, Inc., Box 4086, Austin, Tex.

Gragg, Inc., Box 8686, Britton Station, Oklahoma City.

Grayco Constructors, Inc., Box 4147, Austin, Tex.

G. G. Griffis, Inc., 7805 East Admiral Place, Tulsa.

H

Hallen Co., Inc., 4270 Austin Boulevard, Island Park, N. Y.

Hallmac Construction Co., 3701 Buffalo Drive, Houston.

Harbert Construction Corp., Box 1396, Birmingham, Ala.

Harford Brothers, Box 191, Emporium, Pa.

Luther G. Harper Construction Co., Box 537, Turley, Okla.

A. W. Hartwig, Inc., 302 Fratt Building, Billings, Mont.

A. C. Holder Construction Co., Inc., Box 8616, Tulsa.

Holder Construction Co., Box 1438, Snyder, Tex.

Holdren Construction Co., Box 417, Mount Vernon, Ill.

Hood Construction Co., Box 2167, Whittier, Calif.

Houston Contracting Co., 2707 Ferndale Place, Houston.

M. L. Hulcher Co., Inc., Box 168, Virden, Ill.

J

Jackson Pipe Line Construction Co., Box 455, Glendenin, W. Va.

Jayhawk Construction Co., Inc., Box 419, Great Bend, Kans.

J. A. Jones Construction Co., 209 W. 4th Street, Charlotte, N. C.

K

Knapp Bros Construction Co., Box 225, Oxford, Kans.

Knupp Construction Co., Inc., Box 152, Great Bend, Kans.

L

Laco Pipeline Contractors, Inc., 2120 S. Post Oak Road, Houston.

Latex Construction Co. of Georgia, Box 12128, North Side Station, Atlanta.

Henry L. Lemons & Co., Driscoll Bldg., Corpus Christi, Tex.

C. S. LeNoir & Co., Box 798, Austin, Tex.

Little Inch Pipe Line Contractor, 1311 Pattie, Wichita, Kans.

Lock Construction Co., Box 2776, Midland, Tex.

Lone Star Constructors, Box 13167, Dallas.

M

M. G. M. Construction Co., Box 1056, Concord, Calif.

M-R Construction Co, Box 484, Wichita, Kans.

M&R Pipeliners, Inc., Box 56, Camp Hill, Pa.

Macco Corp., 14409 S. Paramount Blvd., Paramount, Calif.

Marine Gathering Co., 510 Texas National Bank Building, Houston.

Mary Construction Co., Inc., Box 423, Cape Girardeau, Mo.

Massey Pipe Line Construction Co., Box 2099, Corpus Christi, Tex.

O. W. Mayfield Contracting Co., Box 663, Andrews, Tex.

J. Ray McDermott & Co, Inc., Drawer 38, Harvey, La

J. L. McFadden, Box 12184, Houston.

McVean & Barlow, Inc., Box 151, Odessa, Tex.

McWilliams Dredging Co., Box 584, New Orleans.

John Meehan & Son, 916 W. Dakota St., Philadelphia.

Merritt-Chapman & Scott Corp., 260 Madison Avenue, New York.

Mid-States Construction Co., Inc., Box 417, Mount Vernon, Ill.

Midwestern Constructors, Inc., 105 North Boulder, Tulsa.

Midwestern Contractors, Inc., Box 587, Wheaton, Ill.

Midwestern-Johnson-Dixon, Gilroy, Calif.

Miller & Smith Contractors, Littleton, Colo.

Miller Brothers Contractors, 765 Ballinger St., Abilene, Tex.

Missouri Dredging Co., 2100 N. Wharf, St. Louis.

Missouri Valley Dredging Co., 1331 S. Twentieth Street, Omaha.

Mitchell Construction Co., Inc., 301 W. Fifty-third Street, N., Wichita, Kans.

Modern Welding Co., Inc., 1500 E. 12th St., Owensboro, Ky.

M. L. Moore Construction Co., Box 1444, Odessa, Tex.

Morrison Construction Co., 1834 Summer Street, Hammond, Ind.

Morrison-Knudsen Co., Inc., 74 New Montgomery St., San Francisco.

J. W. Mundy Construction Co., 4515 Galveston Road, Houston.

Bill Murry & Co., 2495 Gulf St., Beaumont, Tex.

Directory

N

J. P. Neill & Co., 705 Meadows Bldg., Dallas.

H. H. Null Pipeline Contractors, 2120 S. Post Oak Road, Houston.

O

Ohio Pipe Line Construction Co., Box 29, Newark, Ohio.

Oklahoma Pipe Line Constructors, Box 13227, Dallas.

Oldham Bros. Welding & Construction Co., 909 Gladewater Road, Longview, Tex.

Oman Construction Co., Inc., Box 146, Nashville.

P

Pacific Pipeline Construction Co., 1632 S. Greenwood Ave., Montebello, Calif.

Panama, Inc., 2201 Commerce Building, Houston.

Panama-Williams Corp., 1418 Melrose Building, Houston.

Omer E. Partain, Pipeline Co., Box 812, Snyder, Tex.

Pavillion Pipe Line Corp., Box 126, Leroy, N. Y.

Sam B. Pearce, 13801 S. Central, Los Angeles.

Pentzien, Inc., 1504 Dodge Street, Omaha.

Permian Basin Construction Co., Inc., Box 3049, Odessa, Tex.

Permian Basin Pipe Line Co., Crane Highway, McCamey, Tex.

A. T. Perry Pipe Line Construction, Inc., 353 E. 69 Highway, Kansas City, Mo.

Petroleum Construction Co., Box 4079, Corpus Christi, Tex.

Petty Construction Co., Box 1932, Corpus Christi, Tex.

Pierce Construction Co., Box 3115, Tulsa.

Pioneer Construction Co., 1300 Oak, Chattanooga.

Pipe Line Construction Co., 1918 Jefferson Blvd., Point Pleasant, W. Va.

Pipe Line Construction Co., Inc., South Houston, Tex.

Pipeline Construction & Drilling Co., Box 165, Camp Hill, Pa.

Pipeline Maintenance & Construction, Inc., Box 56, Camp Hill, Pa.

Pipeline Service Co., Box 32, Seminole, Okla.

Pipeline Welding Construction Co., 150 Washington Avenue, Carteret, N. J.

Pipeline Welding & Construction Co., Box 189, Oswego, Kans.

Pitts & Bryant Co., Inc., Box 432, Clarksville, Ark.

Point Construction Co., Reagan and Sausacito, Los Alamitos, Calif.

Poston Pipe Line Co., 615 Metropolitan Building, Akron.

R. B. Potashnick Co., Box 423, Cape Girardeau, Mo.

H. C. Price Co., Box 1111, Bartlesville, Okla.

Roy Price, Inc., 225 Bush Street, San Francisco.

Ted Price Construction Co., Box 72, Electra, Tex.

R

Reese Brothers Construction Co., Hugoton, Kans.

Refinery Construction Co., of Houston, Box 6734, Houston.

River Construction Corp., Box 9127, Fort Worth.

Alex Robertson Co., Box 757, Paramount, Calif.

C. L. Rogers Construction Co., Inc., Box 1706, Wichita Falls, Tex.

Rosendahl Corp., 11933 Wilshire Boulevard, Los Angeles.

S

N. A. Saigh Co., Inc., Suite 531, Majestic Building, San Antonio.

San Juan Basin Construction, Inc., Box 2116, Farmington, N. M.

Service Pipe Line Construction Co., 1165 E. Burnett, Long Beach, Calif.

Shamrock Construction Co., 307 Mutual Building, Lansing 7, Mich.

Sharman, Allen, Gay & Taylor, Inc., 3115 Buffalo Drive, Houston.

Sheehan Pipe Line Construction Co., 514 National Bank of Tulsa Building, Tulsa.

Sheppard-Geiger Construction Co., Box 2098, Corpus Christi, Tex.

Sierra Pipe Line & Construction Co., Box 268, Sta. B, Bakersfield, Calif.

Slade & McElroy, Inc., Box 255, Gulfport, Miss.

Carl E. Smith, Inc., Box 4, Sandyville, W. Va.

W. H. Smith Pipe Line Construction Co., East Main, Wilson, Okla.

Sneed Contractors, Inc., Highway 80 East, Eastland, Tex.

Somerville Construction Co., 6648 Fulton Road, Ada, Mich.

Sooner Construction Co., 1005 NE Twenty-fifth Street, Oklahoma City.

Standard Pipe Line Construction Co., Box 1055, Farmington, N. M.

Stuart Pipe Line Construction Co., Box 790, Beeville, Tex.

Submarine Pipeline Construction Co., Box 86, Port Lavaca, Tex.

Swinerton & Walberg, 220 Bush Street, San Francisco.

T

T&M Pipe Line Construction Co., 205 Medina Street, Lodi, Ohio.

T-T Construction Co., Box 267, Tomball, Tex.

Texas-Louisiana Contractors, 6100 Camp Bowie, Fort Worth.

Joe Titsworth, Box 1539, Kilgore, Tex.

Trojan Construction Co, Inc., 1416 N. Robinson St., Oklahoma City.

Troth Construction Co., Box 592, Britton, Okla.

U

United States Pipeline Constructors, Inc., 300 W. Seventy-ninth Terrace, Kansas City, Mo.

V

Vaughn & Taylor Construction Co., 2103 N. Grant Street, Odessa, Texas.

Vedal Pipe Line Construction Co., Rt. 5, Salem Road, Mount Vernon, Ill.

W

Walco Engineering & Construction Co., Box 3037, Tulsa.

Wescan Pipeliners, Ltd., Box 8686, Oklahoma City.

Western Construction Co., Box 798, Austin 64, Tex.

Western Constructors, 705 Meadows Building, Dallas.

Western Pipe Line, Inc., Box 1076, Austin 1, Tex.

Wheat Pipeline Construction Co., Box 77, Grand Cane, La.

M. E. White Pipe Line Construction Co., Box 441, McPherson, Kans.

Williams Brothers Co., 326 National Bank of Tulsa Building, Tulsa.

Williams-Austin Construction Corp., 3322 Grant Building, Pittsburgh.

Wirt & Starn, Inc., 137½ S. Market Street, Wooster, Ohio.

Y

J. E. Young Pipe Line Contractor, Inc., 931 E. Rosecrans Avenue, Los Angeles.

L. R. Young Construction Co., Box 372, Salem, Ill.

Z

H. B. Zachry Co., Box 10188, San Antonio.

GENERAL CONTRACTORS—CANADA

J. W. Cain, Sarnia, Ont.

Canadian Bechtel, Ltd., 44 King Street West, Toronto.

Canadian Comstock Co., Ltd., 2-6 Laird Drive N., Leaside, Ont.

Canadian Construction Co., Ltd., Leduc, Alta.

Dutton-Williams Brothers, Ltd., North Canadian Oil Building, Calgary, Alta.

Fulton-Banister, Ltd., 625 Northern Hardware Building, Edmonton, Alta.

Gragg (Canada) Ltd., 295 Kipling Avenue S., Toronto.

Grayco Constructors Canadian, Ltd., 25 King Street, Toronto.

Henuset Bros. Pipe Line Construction, Box 657, Virden, Man.

Keillor Construction Co., Ancaster, Ont.

Majestic Contractors Ltd., 408 Royal Trust Building, Edmonton, Alta.

Majestic-Nelen, Ltd., Edmonton, Alta.

Mannix Co. Ltd., 332 7th Ave. W., Calgary, Alta.

Marine Pipeline & Dredging, Ltd., 640 W. Hastings Street, Commerce Building, Vancouver 2, B. C.

McDonald Welding Ltd., 235 Speers Road, Oakville, Ont.

Mid-Canada Contractors, Ltd., 2249 Yonge Street, Toronto.

Morrison-Shivers, Ltd., (Canada) Box 1226, Dryden, Ont. and Box 1076, Austin, Tex.

Nelen, Ltd., 320 Bay Street, Toronto.

Northern Oilfield Ditchers Ltd., 9916 109th Street, Edmonton, Alta.

Petrol-Structors, Ltd., 709 Eighth Avenue W., Calgary, Alta.

Piggott Construction (Alberta) Ltd., 12522 126th Street, Edmonton, Alta.

Poole Construction Co., Ltd., Rivers, Man.

Price-Poole Pipeline Constructors of Canada, Box 190, Rivers, Man.

River Construction Corp., Ltd., 508-1111 W. George Street, Vancouver, B. C.

Robb Construction Co., Ltd., 1237 Albert Street, Regina, Sask.

Royal Pipeline Construction Co., 11335 Thienes Avenue, El Monte, Calif.

S E Pipeline Construction (Alberta) Ltd., 301 Northern Hardware Building., Edmonton, Alta.

F. E. Shaw, Ltd., Box 291, Sarnia, Ont.

Robert B. Somerville Co., (Ltd.), 4126 Bathurst Street, Toronto.

Telford Construction Ltd., 12405 110th Avenue, Edmonton, Alta.

Universal Pipe Lines Ltd., 604 Northern Hardware Building, Edmonton, Alta.

GENERAL CONTRACTORS—FOREIGN

Compania Tecnica Internacional (TECHINT), Buenos Aires, Argentina, S. A.

Construcciones Collins de Venezuela, C. A., Maracaibo, Venezuela, S. A. and Caracas, Venezuela, S. A.

Constructora El Aguila, S. A., Reforma 30, Mexico D. F., Mexico.

Constructora Rosson-Richards, C. A., Apartado 151, Maracaibo, Venezuela, S. A.

Constructors John Brown, Ltd., 73 South Audley St., London S W I, England.

Societe Entrepose, 161 Rue de Courcelles, Paris Ville, France.

Williams Bros. Sudamericana, Ltd., Apartado 5198, Caracas, Venezuela, S. A.

(For a directory of pipeline engineering firms and pipeline special services contractors, see page 161.)

Here's a demonstration of the use of a regenerator heat-balance calculation to spot data errors

... and for establishing new sets of fluid-unit operating conditions

Here, in graphical form, is a readily understandable and usable relation of the variables which control regenerator heat balance. The authors seek to demonstrate that the cracking catalyst has a direct influence on the dependent variables of CO_2/CO ratio and quantity of coke burned; and indirectly on the independent variables of air rate, regenerator bed temperature, and catalyst circulation rate through the coke burning rate of the catalyst.

By O. A. Wunderlich and F. Emerson Ivey, Jr.

HAVE YOU HEARD the statement that "Catalyst A burns hot"? Are you one who has said that 25 per cent alumina catalyst causes high regenerator temperature? And what is your opinion on the merits of a low CO_2/CO ratio in the regenerator flue gas? Unfortunately, problems of this kind usually arise in conjunction with difficulties in other parts of the fluid unit, making the study difficult.

The regenerator of a fluid unit is not a separate and self-sufficient entity. It is physically and operationally tied to the reactor. But this does not mean that its performance must be studied as part of the entire complex. We believe that the best understanding of the whys and wherefores of regenerator performance results from considering it as a completely isolated system (Fig. 1).

The basic factors controlling regenerator heat balance are simple enough. If one assumes the regenerator bed temperature as a datum plane, then the only heat source is the combustion of the carbon and hydrogen of the coke contained on the incoming spent catalyst. Heat is required to raise all the air to bed temperature, to raise the flue gases from bed temperature to stack temperature, and to raise the catalyst from reactor temperature to regenerator bed temperature. The total of these three heat requirements plus a unit constant for radiation losses must equal the heat from combustion of the coke. Thus:

$$\underset{\text{(comb. of coke at } T_2)}{\Delta H_c} - \underset{\text{(air, } T_0 \text{ to } T_2)}{\Delta H_a} - \underset{\text{(flue gas, } T_2 \text{ to } T_1)}{\Delta H_{fg}} - \underset{\text{(cat., } T_3 \text{ to } T_2)}{\Delta H_{cat.}} - K = 0$$

where T_0, T_1, T_2 and T_3 are temperatures as described in the Appendix.

Now the calculation of each of these four factors should be a matter of simple algebra and stoichiometry, using data available from the normal fluid-unit operating summaries. However, because the necessary physical constants such as heats of combustion and heat capacities are expressed in the literature at the arbitrary standard temperature of 25° C. = 77° F., the calculation datum must be shifted from the regenerator bed temperature to standard conditions.

The heat-balance calculation then assumes the classical form found in many engineering texts. And since the standard temperature is essentially that of the ambient air, no correction is necessary for the inlet-air temperature. Regardless of the increased mathematical manipulations, it should be understood that they are only another means to the same end. The simple equation already described remains as the fundamental relationship which most accurately pictures the actual mechanism of regenerator heat balance.

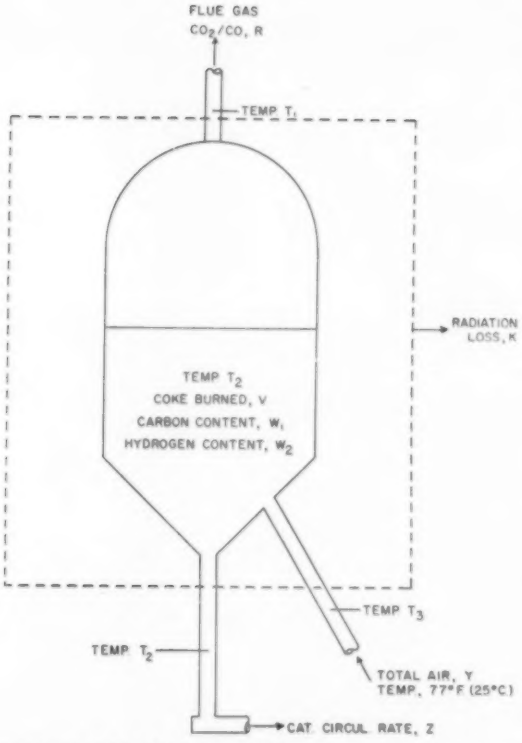
Authors are with Davison Chemical Co., division of W. R. Grace & Co. at Baltimore. Paper presented at Western Petroleum Refiners Association meeting, Casper, Wyo.

Heat Release

We shall not bore you with a recitation of the actual heat-balance equations. These are contained in the Appendix. Instead, we have reduced the equations to more practical and understandable graphs. Let us first consider the matter of heat release (Fig. 2).

The relative heats of combustion of hydrogen to water vs. carbon to carbon dioxide vs. carbon to carbon monoxide make it apparent that higher CO_2/CO ratios and higher hydrogen in coke both result in greater heat release. But above that, the hydrogen in the coke is considerably more influential on heat balance than is the CO_2/CO ratio except at very low CO_2/CO ratios For example, an increase in hydrogen of 1 per cent is equal in effect to about a 0.35 change in CO_2/CO ratio. As will be seen later, this increase in heat release will result in an increase in the regenerator-bed temperature if catalyst-circulation rate is not changed. Thus the importance of efficient stripping to maintain a low hydrogen content in the coke becomes obvious, especially in those units which are troubled by high regenerator bed temperature.

Heat of combustion . . . This, calculated with Fig. 2, is expressed in terms of M. B.t.u. per pound of coke, after all products of combustion have been cooled to 77° F. and the water vapor condensed. These combustion products must then be heated, mathematically, back up to the regenerator outlet temperature, and the heat required to do this must be subtracted from the heat of combustion just determined. Fig. 3 performs both functions. Observe that the flue-gas outlet temperature is not necessarily the same as that of the bed, the differ-



REGENERATOR HEAT BALANCE shows temperatures and amounts of materials entering and leaving, plus heat of combination of the coke burned. Fig. 1.

ence being due to the degree of afterburning, use of spray water or quenching steam, and the like.

Observe, too, that by flue-gas outlet temperature, we mean the temperature at the cyclone outlet, not at some distant point in the stack. But the chart makes clear that a change in flue-gas outlet temperature of as much as several hundred degrees has only a small effect on heat balance. This is because of the relatively low enthalpy of the flue gases. So attempting to control regenerator-bed temperature through manipulation of the flue-gas outlet temperature is not recommended. However, this does not mean that high flue-gas temperatures are unimportant. The opposite is true, since a high flue-gas temperature is a symptom of a thermal condition in the regenerator which might cause severe damage to catalyst and cyclones.

The result of calculations with Figs. 2 and 3 is the heat available after deductions for the heat needed to raise the temperature of the theoretical air requirement to reaction temperature and for the heat lost to the stack, still in terms of M. B.t.u. per pound of coke. The graph in Fig. 4 is a simple multiplication of this available heat by the actual pounds of coke burned per hour to convert from a unit of coke basis to an absolute basis per unit of time. In order to permit one graph to be used for fluid units of any capacity, we have expressed the "coke burned" parameter as "V" $\times 10^x$ where x is any digit which will bring the observed data within the range of the scales. This same digit must then be used consistently on subsequent graphs. It becomes a constant for each particular fluid unit.

Excess air . . . There remains the fact that while the preceding calculations are based on the theoretical weight of air required to burn the coke, all operating plants use excess air. Fig. 5 rectifies this omission by deducting the heat required to raise this excess air from 77° F. to the flue gas outlet temperature. Don't be mislead by the parameter "total air." Although the graph actually accounts for only the heat absorbed by the excess air, we have manipulated the data so that only the more conveniently available total air value is needed.

The final result of the calculations made using Figs. 2 through 5 in consecutive order is the actual amount of heat available for raising the temperature of the circulating catalyst. But the heat requirement of the catalyst can be calculated independently, since both the reactor and regenerator-bed temperatures are known. With the establishment of the heat capacity of the catalyst, the only error lies in the assumption that the small amount of coke contained on it has the same heat capacity as the catalyst. The effect of this assumption is very small.

Radiation loss . . . Fig. 6 relates the heat required to raise the catalyst temperature from reactor temperature to regenerator bed temperature as a function of the only other variable, the catalyst circulation rate. We now have available from Figs. 5 and 6 two heat values, the difference between which should represent the heat actually lost from the regenerator system. However, this is not yet true for units which utilize recycle catalyst coolers, or for operations which use either steam or spray water in the regenerator dome. In these cases, separate calculations must be made to determine the amounts of heat absorbed by each mechanism, and the total added to the heat absorption calculated by Fig. 6. After this correction is made, if required, the difference between the calculated heat release and heat absorbed can be considered the radiation loss, which should be a constant for each unit. At worst, this constant might show a small seasonal trend which can be readily established by experience.

Utility of the Graphs

Now that we have separate graphs which relate all the variables affecting regenerator heat balance, let us consider their utility.

Run-around chart . . . First of all, since we have retained consistent units and consistent quantitative magnitudes in all calculations, the separate graphs can be combined into a single nomograph of the "run-around" type. Fig. 7 is such a combination which can be used in analyzing the operation of any fluid unit regenerator. This nomograph has several general areas of utility, among them:

1. Evaluation of the reliability of a set of regenerator measurements.
2. Establishment of operability of an assumed set of regeneration conditions.

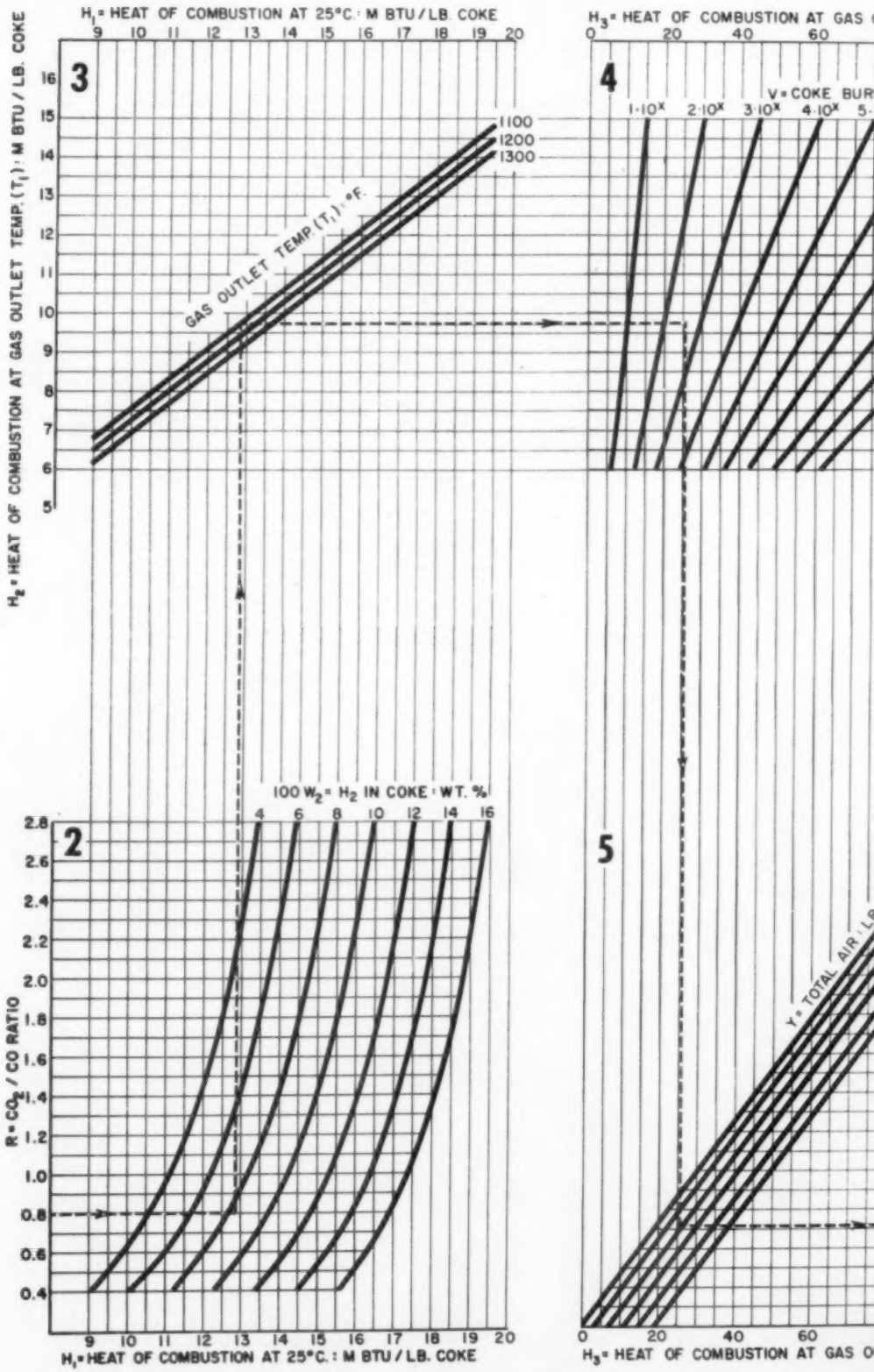
Erroneous Data

Both applications should be preceded by the determination of the specific radiation loss constant "K," using groups of data from the particular regenerator covering as wide a time span as practical. Beginning at the lower-left-hand and the upper-right-hand edges of the nomograph, a series of points will be established in the lower right quadrant where the net heat released and the heat absorbed are compared. If the observed data are valid, all points will fall above the 45° diagonal by an amount equal to the loss constant K. Determination of the average and the standard deviation of these points will provide the actual constant to be used in subsequent calculations. If later data result in a radical change in this known value of "K," it is an indication that one or more of the observations are erroneous.

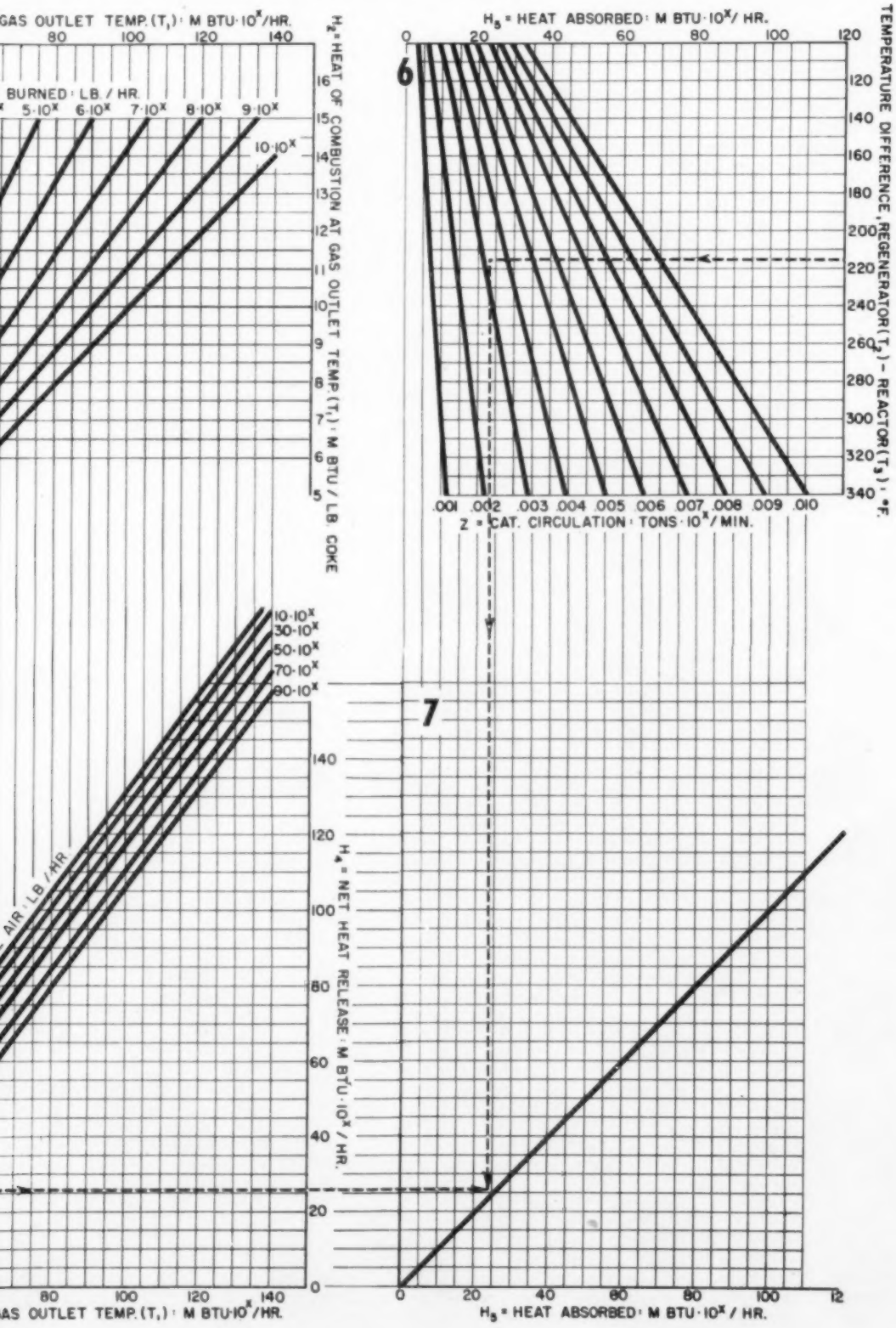
Locating the thermocouple . . . The likelihood of erroneous observations is not remote. We are all inclined to accept recorded measurements as being unquestionably accurate. But

(Discussion continued on page 126)

Use these charts to estimate regener


3
H_1 = HEAT OF COMBUSTION AT 25°C : M BTU / LB. COKE
9 10 11 12 13 14 15 16 17 18 19 20
H_2 = HEAT OF COMBUSTION AT GAS OUTLET TEMP. (T_1) : M BTU / LB. COKE
16 15 14 13 12 11 10 9 8 7 6 5
1100
1200
1300
GAS OUTLET TEMP (T_1) : °F.
4
H_3 = HEAT OF COMBUSTION AT GAS
0 20 40 60
V = COKE BUR
$1 \cdot 10^X$ $2 \cdot 10^X$ $3 \cdot 10^X$ $4 \cdot 10^X$ 5·
2
100 W_2 = H_2 IN COKE : WT. %
4 6 8 10 12 14 16
R = CO_2 / CO RATIO
2.8 2.6 2.4 2.2 2.0 1.8 1.6 1.4 1.2 1.0 0.8 0.6 0.4
9 10 11 12 13 14 15 16 17 18 19 20
H_1 = HEAT OF COMBUSTION AT 25°C. : M BTU / LB. COKE
5
Y = TOTAL AIR : LB
0 20 40 60
H_3 = HEAT OF COMBUSTION AT GAS O

erator heat balance in fluid cat cracking


GAS OUTLET TEMP.(T1) · M BTU·10X/HR.
80 100 120 140
BURNED · LB. / HR.
5·10X 6·10X 7·10X 8·10X 9·10X
10·10X
H2 = HEAT OF COMBUSTION AT GAS OUTLET TEMP.(T1) · M BTU / LB. COKE
16 15 14 13 12 11 10 9 8 7 6 5
10·10X
30·10X
50·10X
70·10X
90·10X
AIR · LB / HR
140 120 100 80 60 40 20 0
H4 = NET HEAT RELEASE · M BTU·10X / HR.
80 100 120 140
AS OUTLET TEMP.(T1) · M BTU·10X/HR.
6
H3 = HEAT ABSORBED · M BTU·10X/ HR.
0 20 40 60 80 100 120
TEMPERATURE DIFFERENCE, REGENERATOR(T2) – REACTOR(T3) · °F.
120 140 160 180 200 220 240 260 280 300 320 340
.001 .002 .003 .004 .005 .006 .007 .008 .009 .010
Z = CAT. CIRCULATION · TONS·10X / MIN.
7
0 20 40 60 80 100 12
H3 = HEAT ABSORBED · M BTU·10X / HR.

Steps in graphic estimation of regenerator heat absorbed or released

Fig. 2—Relates heat of combustion of coke to CO_2/CO ratio, with weight fraction of hydrogen in coke as a parameter. Heat of combustion of coke is expressed in M.B.t.u. per lb. of coke after all products of combustion have been cooled to 77° F. and the water vapor condensed. The CO_2/CO ratios in flue gas depend on type of catalyst and degree of metal contamination.

Fig. 3—Shows graphically the effect of air volume on the heat release. At this point two mathematical operations are necessary: (1) the combustion products resulting from burning the coke must be heated back up to regenerator outlet temperature, and (2) the heat required to do this must be subtracted from the heat of combustion determined by Fig. 2. Both these operations are performed by Fig. 3.

Fig. 4—Presents the effect of coke burned on heat release. This chart converts the available heat (as determined by Figs. 2 and 3) from M.B.t.u./lb. coke to M.B.t.u./hr. (i.e., the available heat determined from Figs. 2 and 3 is multiplied by the actual pounds of coke burned per hour). To permit use of this one graph for fluid cat units of any capacity, the "coke burned" parameter is expressed as "V" $\times 10^x$ where V is coke burned in M. lb./hr. and x is any digit which will bring the observed data within the range of the scales. This digit is a constant for each particular fluid unit.

Fig. 5—Gives the effect of air volume on heat release. The preceding calculation steps were based on the theoretical weight of air required to burn the coke. Fig. 5 takes care of excess air by deducting the heat required to raise the excess air from 77° F. to flue gas outlet temperature. Data have been manipulated in construction of this chart so that only total air value (a more conveniently available figure) is required, although this chart actually accounts for heat absorbed by excess air only.

Fig. 6—Depicts effect of catalyst circulation rate on heat absorbed. It expresses heat required to raise the catalyst temperature from reactor temperature to regenerator bed temperature as a function of catalyst circulation rate. From Figs. 5 and 6 we now have two heat values. The difference between the two should represent the heat lost from the regenerator system. For units which have recycle cat coolers, or employ steam or water sprays in the regenerator dome, separate calculations must be made to determine amounts of heat absorbed by each mechanism. The total is added to the heat absorbed determined by Fig. 6.

Fig. 7—This compares net heat released and heat absorbed. The difference between calculated heat released and heat absorbed can be considered as radiation loss which should be a constant for each unit or might show a small seasonal trend.

EXAMPLE: To illustrate use of the run-around chart, the data in the top line of Table 1 are used.

Enter the chart at lower left with an $R = CO_2/CO$ ratio in flue gas of 0.80 and proceed to a W_2 = weight fraction of hydrogen in coke of 0.083. Now go vertically to a flue gas outlet temperature (T_1) of 1,100° F. From this go horizontally to a coke burned (V) value of 26.4 M. lb./hr. Now go vertically downward to a total air to regenerator (Y) value of 287 M. lb./hr. and then horizontally to find the **net heat release (H_4) as 25.4 $\times$ 10^4 M.B.t.u./hr.**

From the top line of Table 1, the regenerator-bed temperature (T_2) is 1,139° F. and the reactor-bed temperature (T_3) is 924° F. The difference between the two is 215° F. Enter with this value at the upper right-hand side and proceed horizontally to a catalyst circulation rate (Z) of 34.2 tons per minute. Now go vertically down to find the **heat absorbed (H_5) as 23.8 $\times$ 10^4 M.B.t.u./hr.**

TABLE 1—OBSERVED REGENERATOR PERFORMANCE, KELLOGG MODEL II FCCU

	W_2	W_1	R	V	Y	Z	T_1	T_2	T_3	H_4	H_5	K (H_4-H_5)
Aug.	.083	.917	.80	26.4	287	34.2	1,100	1,139	924	25.4	23.8	1.6
Sept.	.085	.915	.79	27.0	292	32.5	1,110	1,148	921	27.0	24.8	2.2
Oct.	.082	.918	.77	27.0	291	31.2	1,090	1,141	916	25.8	23.0	2.8
Nov.	.083	.917	.72	27.7	291	32.6	1,095	1,146	915	25.1	25.0	0.1
Dec.	.093	.907	.73	27.0	289	32.8	1,094	1,143	913	27.0	25.0	2.0
Jan.	.073	.927	.74	27.3	289	33.2	1,098	1,146	919	24.8	25.5	—0.2
Feb.	.080	.920	.79	23.7	263	31.9	1,095	1,112	915	22.0	20.5	1.5
Mar.	.078	.922	.70	28.4	292	31.3	1,110	1,165	925	26.0	24.5	1.5
Apr.	.080	.920	.64	28.8	292	32.1	1,106	1,159	923	26.0	24.7	1.3
May	.074	.926	.68	28.5	291	30.4	1,107	1,158	924	25.8	23.2	2.6
June	.077	.923	.74	27.3	291	33.8	1,101	1,138	923	26.0	25.0	1.0
July	.073	.927	.76	27.6	288	33.6	1,100	1,143	925	25.2	24.0	1.2
Aug.	.075	.925	.67	28.0	286	32.9	1,103	1,147	923	26.2	25.0	1.2
Sept.	.074	.926	.69	28.3	291	32.6	1,105	1,152	927	26.0	24.5	1.5
Oct.	.083	.917	.70	27.6	292	33.6	1,100	1,152	932	26.0	24.5	1.5
Nov.	.078	.922	.67	28.4	291	33.7	1,095	1,153	927	26.2	25.2	1.0

W_1 = wt. fraction of carbon in coke
W_2 = wt. fraction of hydrogen in coke
R = CO_2/CO ratio in flue gas
V = coke burned: M. lb./hour
Y = total air to regenerator, M. lb./hour
Z = catalyst circulation rate, tons/minute
T_1 = flue-gas temperature, °F.
T_2 = regenerator-bed temperature, °F.
T_3 = reactor-bed temperature, °F.
H_4 = net heat released, M. B.t.u. × 10^4/hour
H_5 = heat absorbed, M. B.t.u. × 10_4/hour

Statistical data for "K"
Average = 1.43
Standard deviation = 0.78
95 per cent confidence limits = ±1.56, i.e., +2.99 to −0.13

this is not necessarily the case in a large fluid unit. For example, a single fixed thermocouple may be used to measure and record the catalyst-bed temperature.

It is easy enough for an instrument specialist to guarantee the accuracy of the thermocouple and its measuring and recording instruments. But this is no assurance that the thermocouple itself is located in a position which represents the true average catalyst bed temperature. Experience has shown that wide temperature differences can exist in different portions of a large fluidized catalyst bed because of poor mechanical air distribution or because of poor fluidization resulting from a bad catalyst-particle-size distribution. So a rapid check with the nomograph will either verify the reliability of the data as a whole, or assist in locating the odd observation.

Using the run-around chart . . . Let us look at an example. Table 1 is a tabulation of monthly measurements on the regenerator of a large Kellogg Model II fluid unit. The monthly radiation loss constants have been determined using the nomograph. Visual inspection indicates the lack of seasonal change in the constant, possibly because the plant is located in a warm climate. Furthermore, statistical analysis of the 16 constants indicates that their variability around the average follows a normal probability distribution. Hence the average "K" of 14,000,000 B.t.u./hour can be used as the radiation loss constant for this regenerator. Now suppose that the hydrogen content of the coke for July had been 9.3 per cent rather than the 7.3 per cent actually observed. Inspection of all the hydrogen data would not have caused any suspicion, since the hydrogen content of the coke during the previous December had also been 9.3 per cent. But the resultant "K" would have been 50,000,000 B.t.u./hour, far outside of the established 95 per cent confidence limit of 30,000,000 B.t.u./hour. By means of the nomograph, the error is detectable.

New Regenerator Conditions

The use of the nomograph to determine the operability of a new set of regenerator conditions is straightforward. Suppose that it is desired to operate the reactor of the previously mentioned Kellogg unit at a higher conversion level which requires a reactor bed temperature of 935° F. and a catalyst circulation rate of 37 tons per minute. The question of concern is whether the resultant 4,500 lb. per hour increase in coke yield will raise the regenerator temperature beyond an imposed maximum of 1,160° F. Since neither the catalyst nor the charge stock is to be changed, we can assume that the CO_2/CO ratio of the flue gas and the hydrogen content of the coke should remain essentially constant. The quantity of air required to burn the new amount of coke is calculated to be 323,000 lb. per hour, basis the operating experience tabulated in Table 1. With this information, the radiation loss constant of 1.43 × 10^4 M. B.t.u./hour already established, a rapid calculation with the nomograph predicts that the differential temperature between regenerator and reactor will be 242° F. So with the reactor at 935° F., the resultant regenerator temperature would be 1,177° F., hence the desired reactor conditions would result in an inoperable regenerator.

Effect of Cracking Catalyst

Now that the use of the nomograph is understood, let us see how the cracking catalyst affects the regeneration variables related by it. To do this, we shall consider each variable in the order contained in the correlation.

What about CO_2/CO ratio? . . . This ratio in the flue gas is known to depend upon the type of catalyst and its degree of contamination by metals in the charge stock. For example, we are aware of a certain Canadian crude which is high in soluble-iron content, so that the cracking catalyst is often highly contaminated. In one fluid unit, the CO_2/CO ratio reached the unusual level of 5 when the iron content of the catalyst was 4.2 weight per cent. A subsequent improvement in feed preparation lowered the iron on catalyst to 1.0 weight per cent, and the CO_2/CO ratio dropped to 2.9. At a constant hydrogen content in coke of 10 per cent, this reduction in CO_2/CO ratio lowered the heat of combustion nearly 9 per cent, sufficient to severely affect heat balance and regenerator temperature.

Different types of catalyst have inherent CO_2/CO characteristics. While actual numbers may vary from operation to operation, the following scale of values is relatively typical of commercial practice:

Bentonite base natural catalyst	2.0
Sulfur-resistant natural catalyst	1.5
13 per cent alumina synthetic catalyst	1.2

The graph in Fig. 2 shows the relative amounts of heat released with these CO_2/CO ratios as 1.08, 1.035, and 1.0 based on synthetic catalyst as unity. It is obvious, then, that somewhat different operating conditions will prevail in the regenerator as a result of the effect of catalyst type on the CO_2/CO ratio alone.

Hydrogen content . . . We have already mentioned the great effect of the hydrogen content of the coke on heat balance. Unfortunately, commercial data are less than clear on the relationship of catalyst to hydrogen in coke, for changes in the mechanics of stripping tend to overshadow any real effects of the catalyst itself. We have data which suggest that a 13 per cent alumina synthetic catalyst of high pore volume produces less hydrogen in coke than the same catalyst with a lower pore volume, possibly because of improved ease of stripping. Conn,

Meehan and Shankland reported[1] that silica-magnesia catalyst was more difficult to strip than silica-alumina, and that its average pore size appeared to be smaller. Both these observations indicate that the catalyst may influence the hydrogen in coke through a relation between its pore structure and stripping efficiency.

Flue-gas outlet temperatures . . . Experience indicates that the flue-gas outlet temperature is controlled by unit design, operating practice and, at times, by catalyst performance. Unit design and operating practice dictate the amount of spray water or quench steam which are necessary to eliminate afterburning, and these naturally affect the outlet temperature. Afterburning itself appears to originate from any of several causes: high regenerator temperature, high excess oxygen, and poor air distribution through the catalyst bed, none of which are necessarily caused by the catalyst.

But this does not mean that the catalyst is never related to high gas-outlet temperature. If a catalyst, either because of its inherent characteristics or because of maltreatment during use, possesses a slower regeneration rate, then the higher bed temperature and oxygen partial pressure needed to promote combustion on this particular catalyst can certainly result in higher gas-outlet temperatures. But in this case, the higher outlet temperature is again the result of the action of the above regeneration variables.

How Is Regenerator Heat Balance Affected?

Theoretical considerations show that the catalyst will affect regenerator heat balance by the effect of its inherent burning rate on the quantity of coke burned. But in practical operations, changes in operating conditions are made in order to hold the coke burned constant. Hence the influence of the catalysts is usually found in the changes in these conditions. A practical example might clarify this point. Assume a unit which burns 10,000 lb. of coke per hour, and has a catalyst circulation rate of 15 tons per minute. Then the coke laydown represents 0.55 weight per cent of catalyst, and this amount must be removed in the regenerator if operation is to continue.

Now, if the regeneration rate were to decrease by as little as 1 per cent, i.e., 100 lb. less coke were burned each hour with the same catalyst circulation, a coke buildup on the catalyst would take place at the rate of 0.0055 wt. per cent of catalyst per hour, or nearly 0.15 wt. per cent per day. Quite obviously, no unit would operate for many days under such a condition. As the coke on catalysts increases, operational changes are made to maintain original levels, and the quantity of coke burned remains the same. And this returns us to our major point: In continuous commercial operation, the effects of the coke-burning rate of the catalyst will most frequently appear as changes in operating variables, not as the quantity of coke burned. In extreme cases where the catalyst has a very slow regeneration rate, the coke level on the regenerated catalyst may also increase.

Independent Variables

Thus far we have examined four dependent heat-balance variables and have determined that only CO_2/CO ratio and quantity of coke burned are affected by the catalyst. The independent variables, i.e., air rate, regenerator-bed temperature, and circulation rate can also be affected by the catalyst through its coke burning rate.

Air rate . . . As in any other combustion reaction, the reaction rate for the burning of coke on catalyst is accelerated by an increase in the amount and partial pressure of available oxygen. Pansing has developed an equation[2] relating these and other variables to the specific reaction rate constant for fluidized catalyst. In our present context, the important point is that one of the symptoms of a catalyst having an inherently lower regeneration rate will be an increase in the excess oxygen in the flue gas for the same level of coke on regenerated catalyst. But the nomograph shows that the additional amount of air used will have only a small effect on heat balance. From the heat-balance standpoint alone, most operations could easily afford the extra air required to regenerate a slow-burning catalyst. Nevertheless, prudent operation dic-

Appendix
Heat-Balance Equations

Symbols Used

W_1—Weight fraction carbon in coke
W_2—Weight fraction hydrogen in coke
R—CO_2/CO ratio in flue gas
V—Coke burned, M. lb./hour
Y—Total air to regenerator, M. lb./hour
Z—Catalyst circulation rate, tons/minute
T_1—Gas outlet temperature, °F.
T_2—Regenerator-bed temperature, °F.
T_3—Reactor-bed temperature, °F.

H_1—Heat of combustion of coke at 25° C. (77° F.), M. B.t.u./lb. coke
H_2—Heat of combustion of coke at gas outlet temperature (T_1), M. B.t.u./lb. coke
H_3—Heat of combustion of coke at gas outlet temperature (T_1), M. B.t.u./hour
H_4—Heat of combustion at gas outlet temperature (T_1) corrected for excess air, M. B.t.u./hour
H_5—Heat absorbed by circulating catalyst
$H_4 - H_5 = K$ = Radiation loss constant

Fig. 2, Heat of Combustion of Coke

$$H_1 = 3.96 + 10.15\,A + 57.52\,W_2 - 10.15\,W_2A \qquad \text{where } A = R/(R+1)$$

Fig. 3, Heat Absorbed by Combustion Gases

$$H_2 = H_1 - \left[\frac{(T_1 - 77)(1.445\,A - 1.445\,AW_2 + 9.394\,W_2 + 1.729)}{1{,}000} + 1.052\,W_2 \right]$$

Fig. 4, Effect of Coke Burned on Heat Release

$$H_3 = H_2\,V$$

Fig. 5, Effect of Air Volume on Heat Release

$$H_4 = H_3 - \{(T-77)/1{,}000\,[0.245\,Y - V(1.409\,A + 7.043\,W_2 - 1.409\,AW_2 + 1.409)]\}$$

Fig. 6, Effect of Catalyst Circulation on Heat Absorbed

$$H_5 = 32.4\,(T_2 - T_3)\,Z$$

Constants, at Standard Conditions of 25° C. (77° F.), 1 Atm.

Gross heat of combustion of C to CO_2, M. B.t.u./lb. mole reactant	169.293
Gross heat of combustion of C to CO, M. B.t.u./lb. mole reactant	47.548
Gross heat of combustion of H_2 to H_2O, M. B.t.u./lb. mole reactant	122.971
Heat of vaporization of water, M. B.t.u./lb.	1,052

Constants, Mean, Over Temperature Range 77° F. to Average Gas-Outlet Temperature

Heat capacity of CO_2, B.t.u./lb. mole/°F.	11.0
Heat capacity of CO, B.t.u./lb. mole/°F.	7.2
Heat capacity of N_2, B.t.u./lb. mole/°F.	7.2
Heat capacity of H_2O (vapor), B.t.u./lb. mole/°F.	8.7
Heat capacity of air, B.t.u./lb. mole/°F.	7.1
Heat capacity of catalyst, B.t.u./lb./°F.	0.27

tates the use of the minimum amount of excess oxygen commensurate with a reasonable level of carbon on regenerated catalyst to conserve air blower capacity and to minimize afterburning which can severely damage cyclones and catalyst.

Bed-temperature level . . . The two remaining heat-balance variables which are influenced by the coke-burning rate of the catalyst are the bed-temperature level and the catalyst residence time. The combustion reaction of coke is promoted by a higher regenerator-bed temperature and by a longer residence time in the bed. Residence time can be partially controlled independently of any of the heat-balance variables by varying the regenerator catalyst holdup.

Catalyst residence time . . . The remaining control of the time variable lies in the catalyst circulation rate. But circulation rate and regenerator bed temperature are inter-related by heat balance, as Fig. 6 has already indicated. Fortunately, the demands of the catalyst and those of heat balance are directionally consistent. If a catalyst should require a higher regeneration temperature to compensate for a slower coke burning rate, the normal mechanism by which the bed temperature could be raised would be a reduction in the catalyst circulation rate so that less heat would be removed from the regenerator.

This lower circulation rate would itself tend to improve coke burning by increasing the residence time, thereby minimizing the temperature increase required. The increase in bed temperature and the reduction in catalyst circulation would tend to minimize any change in heat absorption, so that a new operating equilibrium could be obtained. Use of the entire nomograph will assist in establishing the actual new set of operating conditions.

The Question of High Regenerator Temperature

Having examined the mechanism of regenerator heat balance and the function of the catalyst therein, we can now consider the questions posed at the beginning of this discussion.

It should be apparent by this time that the statement "Catalyst A burns hot" represents only a superficial relation to the technical facts. As we have seen, a catalyst may lead to a higher regenerator temperature through an increase in the CO_2/CO ratio or because of an inherently lower coke-burning rate, but the implied picture of a change in the surface combustion properties is certainly inaccurate.

During the past several years, we have received numerous reports that 25 per cent alumina catalyst has caused high regenerator temperatures. Again, this is true only in a very restricted sense. It would be just as accurate to blame plant design limitations, for the high temperature in this case is not at all related to catalyst regeneration. Here is why! In many cases, 25 per cent alumina catalyst has demonstrated a very high activity maintenance. In order to hold conversion to a reasonable level, it has therefore been necessary to reduce the severity of the other cracking reaction variables, among them the reactor bed temperature. The only means for reducing the reactor temperature in heat-balance units is to lower the catalyst-circulation rate. And since high alumina catalyst does not affect any of the regeneration variables, the heat-balance nomograph makes clear that the lower catalyst-circulation rate must increase the regenerator temperature.

For example, a test run of 25 per cent alumina catalyst in the UOP stack-type unit of Frontier Oil & Refining Co.[3] resulted in an increase in circulating catalyst activity of D+L even though the fresh-catalyst addition rate was reduced. The reactor temperature was therefore decreased from 885° to 879° F., with a reduction in catalyst-circulation rate from 14 to 12.5 tons per minute. And as a result, the regenerator-bed temperature increased from 1,120° to 1,140° F. Now, when these data are applied to the graph in Fig. 6 (or to the heat-absorption section of the nomograph), it is seen that there was no net change in the heat absorbed by the catalyst in the regenerator. The increase in regenerator-bed temperature was solely the result of operational changes in the reactor, brought about by the inflexibility of the plant in coping with a catalyst quality which is normally considered advantageous. In this particular example, the regenerator temperature change was not limiting. Other units were not as fortunate.

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PENNSYLVANIA — This 22-B dragshovel is one of several digging trench for a 24-in. natural gas line across the northern section of Pennsylvania. On jobs like this, profitable dragshovel service is assured by Bucyrus-Erie top quality construction.

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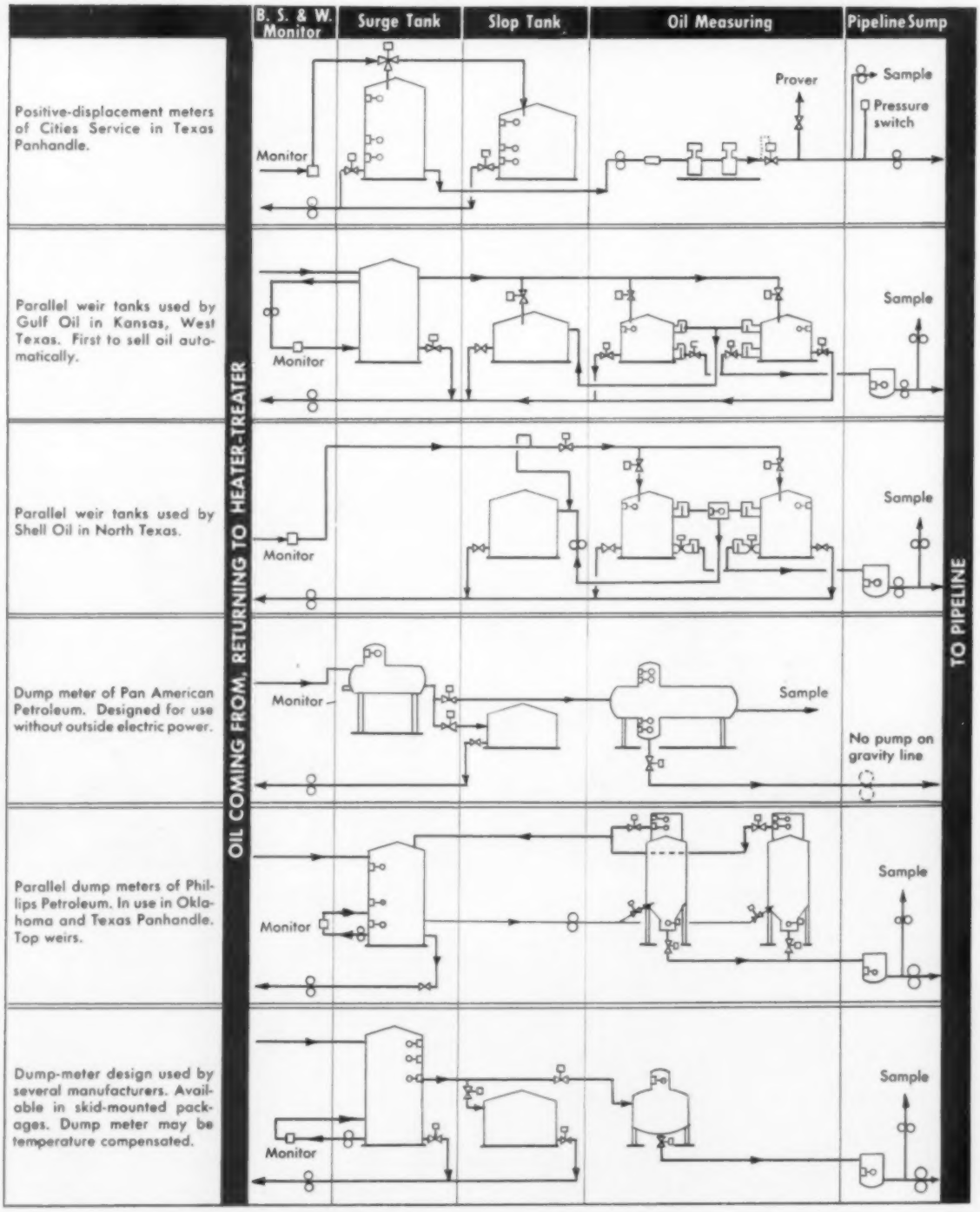
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Monitor
Sample
Dump meter of Pan American Petroleum. Designed for use without outside electric power.
Monitor
Sample
No pump on gravity line
Parallel dump meters of Phillips Petroleum. In use in Oklahoma and Texas Panhandle. Top weirs.
Monitor
Sample
Dump-meter design used by several manufacturers. Available in skid-mounted packages. Dump meter may be temperature compensated.
Monitor
Sample

THESE LACT SYSTEMS are representative of the units now in use. Fig. 1.

LACT—And why we like it

In the 2 years since oil first was sold automatically, the number of LACT (lease automatic custody transfer) units has snowballed. Here are some of the big points that stand out to date:

- **LACT works; it can save money.**
- **More and more LACT units are coming.**
- **For now, payout is surer if you install LACT when building a new battery or replacing an old one.**
- **P.d. meters are getting the nod for volume measure but there's plenty of room for other types.**
- **There's still no cheap, sure way to get b.s. and w. and gravity accurately enough without an automatic sampler.**

By Ed McGhee
District Editor

IN OCTOBER 1955 there was only one lease in the country selling oil automatically.[1] Today, there are probably 100 or more. There are some big reasons why oil producers and pipeliners like the idea of LACT:

1. LACT can save labor.
2. LACT batteries cost less than conventional batteries.
3. LACT units lose less of light ends.
4. LACT measurement is more accurate.

Where gains come from . . . Both producer and pipeliner stand to save labor with LACT. On a lease with conventional equipment, both a pipeline gager and producer's pumper might visit the tank battery every day. They would visit a LACT battery only once each 2 weeks or once each month. As a result, a gager can handle many more batteries and a pumper can service many more wells.

At this stage of development, it is hard to show a payout for a new LACT unit on a small lease if you can't operate it with fewer men. That is, fewer men for either the pipeline or the producer or both. However, not all LACT units now operating are doing so with fewer men. One reason is that many of the units are experimental. Another reason is that a single LACT battery doesn't relieve the work load in the area enough to make a man surplus. The pumper or gager must be kept on for other duties and, as a result, there are just as many men as before.

Still, if several LACT batteries can be installed in the same area, they are almost certain to cut labor needs.

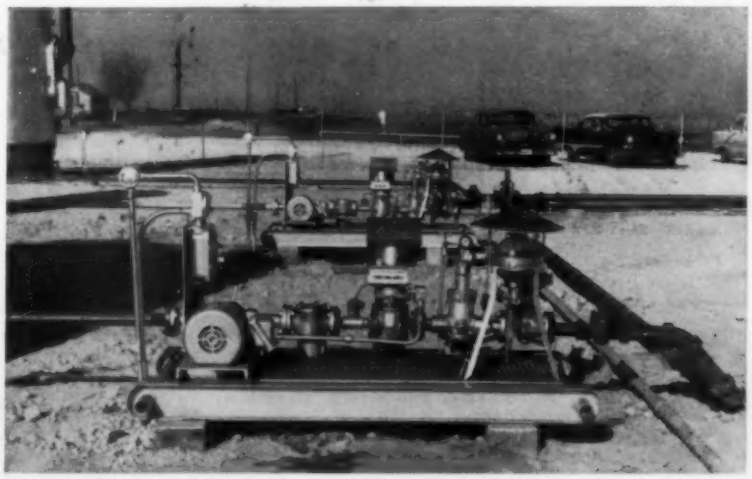
No pipeline or producing company which has installed LACT systems expects to make any layoffs because of this automation. First of all, it is hard to justify the investment for LACT units on most leases in old producing areas at this time. For that reason, use of LACT units likely won't grow fast enough to catch up to normal turnover. Second, since the industry is continually expanding, men displaced in one area will be in demand in new areas.

Breakeven point . . . The volume of oil you have to run for a LACT battery to be cheaper than a conventional battery depends on the system you install. Some are more elaborate and expensive than others. But, one company figures it can install an LACT battery to run 300 bbl. per day for $8,000; and a conventional battery to handle the same amount of oil would likely cost $10,000. For production higher than this 300 bbl. per day, cost of a conventional battery goes up accordingly, but cost of a LACT battery goes up little.

When you are replacing old tanks in a battery running more than 300 or 400 bbl. per day, LACT would likely be cheaper.

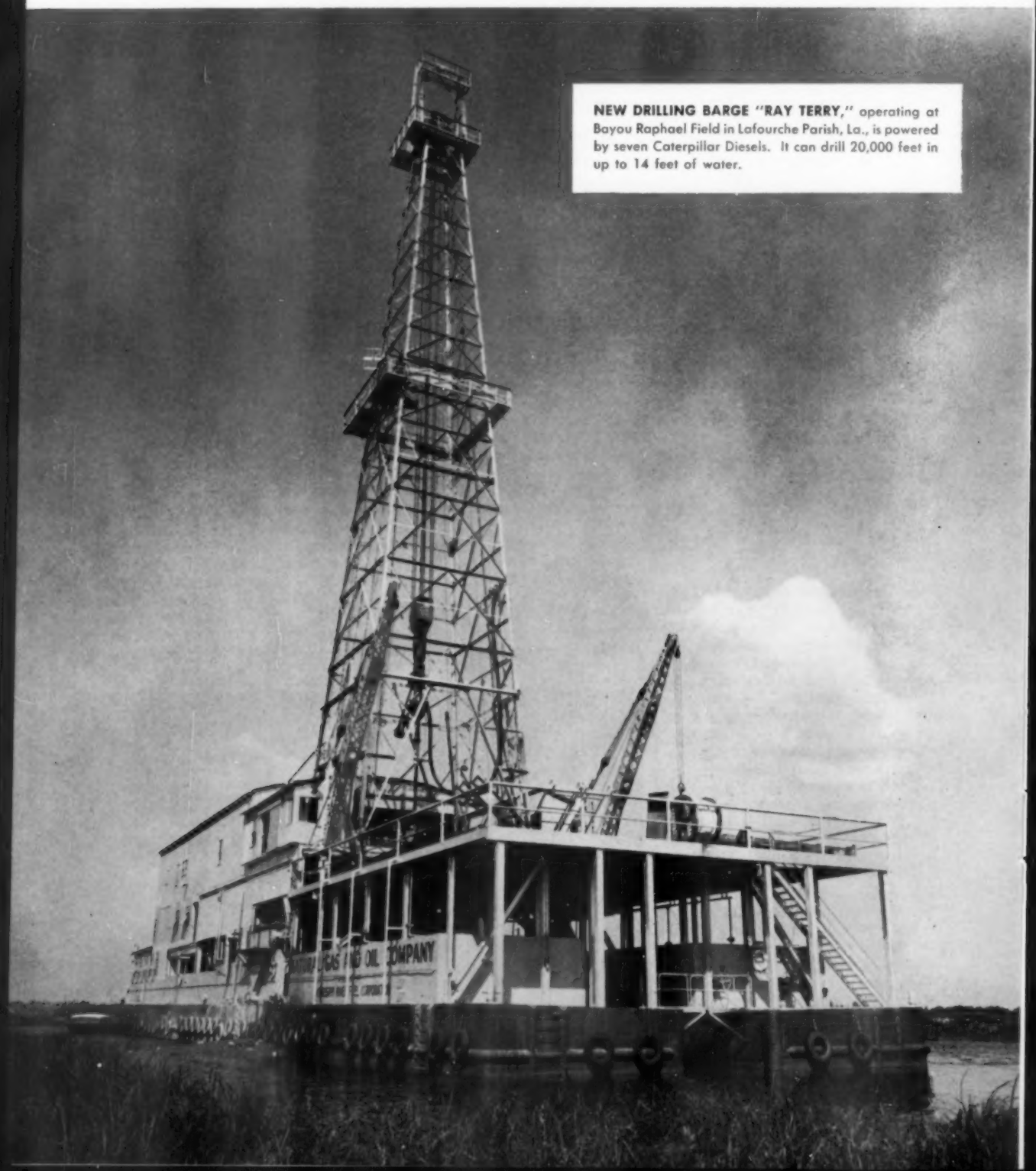
If old batteries are still good and there's no place to use salvaged tanks, it's hard to justify writing off these battteries and laying out money for new LACT units. Only a big labor saving would make this worth while.

On both the two new crude pipelines out of the Four Corners area of Colorado, New Mexico, Utah, and Arizona, there are many new positive-displacement-meter type LACT units. Both producers and pipeliners took advantage of the necessity to build new batteries. Not only are these batteries cheaper to build, but they also make a big saving in the



P.D. METERS are used by Cities Service at unit installed in the Texas Panhandle. These are the first of this type in Texas. Fig. 2.

HOW THE "RAY TERRY" CUTS COSTS AND BOOSTS EARNINGS



NEW DRILLING BARGE "RAY TERRY," operating at Bayou Raphael Field in Lafourche Parish, La., is powered by seven Caterpillar Diesels. It can drill 20,000 feet in up to 14 feet of water.

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Ask the owners of the new 215-foot drilling barge, "Ray Terry," why they selected CAT* Diesel Electric Power and they'll give you hard dollars-and-cents reasons. Like this:

"From past experience we find Cat Oilfield Engines are the cheapest per continuous rated horsepower." That's straight from Mort Squires, assistant general superintendent for Natural Gas & Oil Company, which owns the inland drilling barge.

But just as important, the flexibility of these powerful, compact units helps assure maximum earnings. Four D397 Diesels with DC generators are compounded to drive Ideco drawworks and Emsco mud pumps. Power from these electric sets is easily directed anywhere it's needed. And, with four units, the barge loses only 25% power when an engine is shut down for maintenance. If there were just two larger units, fully half the power would be lost from down time on either one.

In addition to these four diesel-electric units, the "Ray Terry" has two D397 Turbocharged Diesel Electric Sets for auxiliary AC power and a D337 driving an Emsco pump.

Caterpillar* performance sold these engines. Their heavy-duty design has given them a reputation for dependability, low operating cost and minimum down time throughout the world. Rig owners choose the Cat power plant proven best for their needs. A full line of these four-cycle engines is available up to 650 HP (maximum). Matching generators provide up to 350 KW. When selecting your oilfield equipment always specify Cat Power.

Engine Division, Caterpillar Tractor Co., Peoria, Ill., U.S.A.

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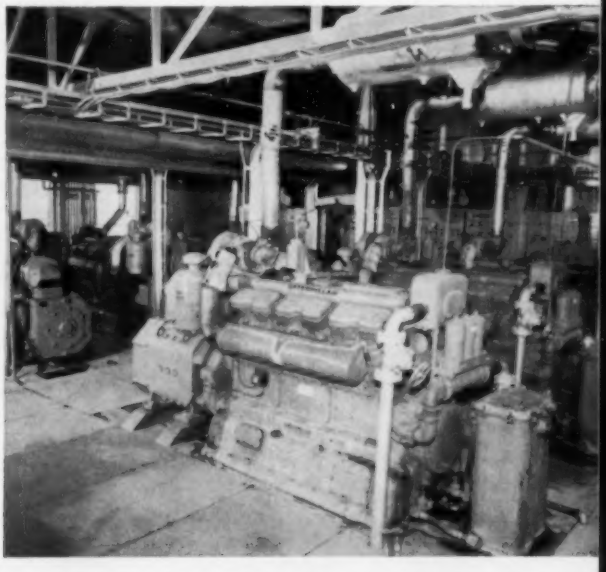
MORT SQUIRES, assistant general superintendent, reports, "We find Caterpillar Engines are dependable and economical. From past experience, we find they are the cheapest per continuous rated horsepower."

FOUR COMPACT D397s with DC generators drive Ideco drawworks and Emsco mud pumps on the "Ray Terry." These dependable turbocharged oilfield engines give the barge more flexible power at low operating cost.



Cylinder liners typical of quality in Cat Engines

Full-length, wet-type liners in all Cat Engines are "Hi-Electro" hardened to provide extra-long liner and ring life. Direct contact of liner and coolant assures proper operation for many thousands of hours.

Dept. OG1, Engine Division
CATERPILLAR TRACTOR CO., Peoria, Illinois, U.S.A.

Send me more information about Caterpillar Diesel Engines. I have checked the proper box to guide your selection of material.

- ☐ I would like detailed information, as I may be in the market for a Cat Engine or Electric Set. I understand I am under no obligation.
- ☐ I am interested in learning more about these engines.

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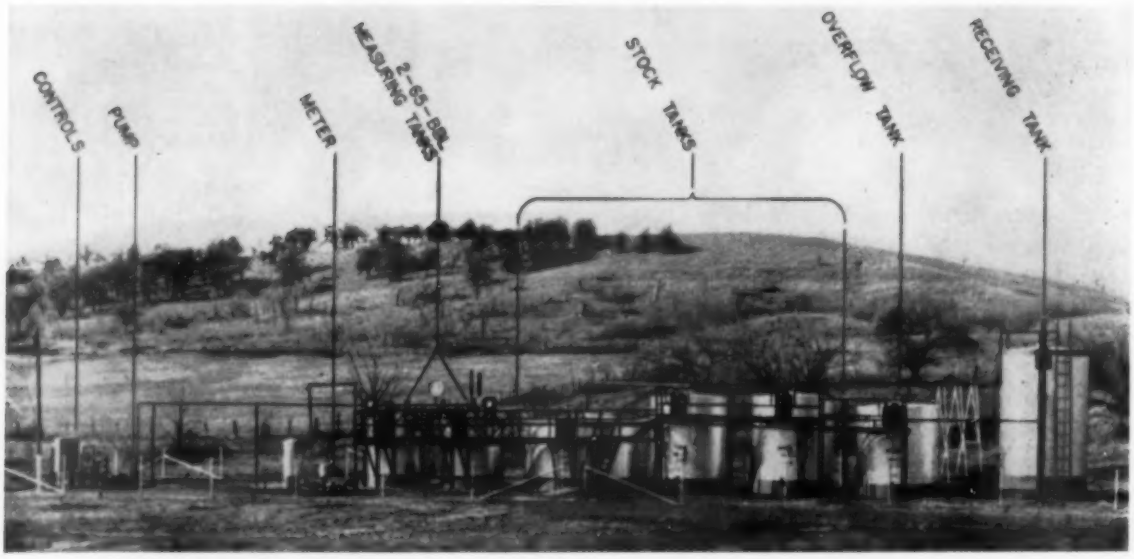


THIS WEIR-TANK SYSTEM is operated by Gulf Oil Corp. in Kansas and West Texas. Fig. 3.

high labor expense of such remote areas.

Accuracy and saving . . . Every LACT unit thus far installed is designed to measure a lot closer than the "nearest ¼-in." that is customary with hand-gage lines. This can mean a lot of money to both producer and pipeliner.

As an example of the importance of accuracy, one company buys a lot of oil in a Texas field where paraffin is bad. The paraffin crust inside tanks makes it appear that the pipeline gets more oil than the producer actually delivers. The pipeline put in p.d.-meter LACT units which aren't affected by paraffin. The meters paid themselves out in a few short months by eliminating the errors caused by paraffin deposition.[2]

In almost all cases, the gravity of the oil goes up after LACT is installed. This is because the crude doesn't stay in the tanks so long and the light ends have less time to escape. Gravity increase has run from 0.2° to 0.5° API. While the higher gravity seldom means a higher price for the oil, it always means more barrels of oil. That is, a gravity increase of 0.3° API in many crudes raises volume about 0.45 per cent.[3] In a system running 300 bbl. of oil per calendar day, this would be a gain of about 500 bbl. per year.

Other advantages too . . . There are important side advantages to LACT.[4] Some of these are:

1. Fewer chances for error.
2. Simpler computing and accounting.
3. Better scheduling of runs.
4. Better tie-in with other automatic equipment.
5. Less investment in stored oil.

There are fewer chances for error because there are fewer hand operations with LACT. Accounting and computing are simpler because there are fewer run tickets and no top and bottom gages are recorded. Many of the run tickets are printed automatically. And, with p.d. meters, there's no need to record temperature.

Most LACT units have time clocks so that the unit can be preset to pump to pipeline only at certain times of the day. However, most units ordinarily discharge "around the clock." Unlike conventional operation where early morning is a period of peak use, the LACT operation is smooth with no peaks and valleys. As a result, in some cases gathering lines might be smaller than otherwise.

Disadvantages and problems . . . Like anything else, there are two sides to the LACT picture. Some of its disadvantages are:[5]

1. More precise equipment is needed.
2. The LACT system may be complex.
3. Regular, skilled maintenance is required.

In a few cases, you might consider the necessity for good maintenance to be an advantage. There are also problems; most of them are not difficult to solve:

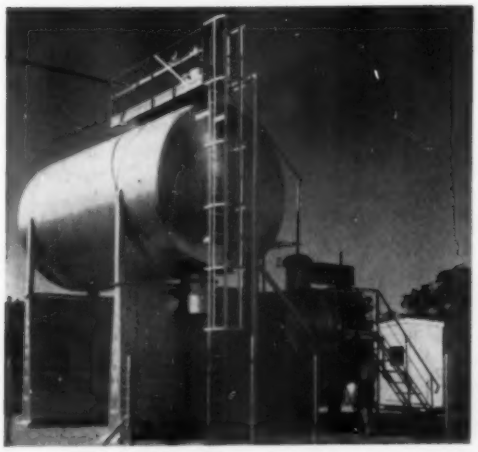
1. Treating system must deliver clean oil consistently.
2. Settling time must be long enough to make oil relatively stable.
3. Volume, gravity, temperature, and b.s. and w. must be accurately measured and reliably recorded.
4. Dirty oil must be rejected and recirculated.
5. Manual controls for emergency must not give false readings.
6. There must be protection against weather, tampering, paraffin, corrosion, and the like.
7. The system must schedule runs according to allowables and pipeline batch needs.
8. You should be able to check the system with common tools.
9. The system must be flexible to meet changes in wells, seasons, allowables, etc.
10. The system must be as simple and economical as possible.

Things like treating, settling time, manual controls, scheduling, and weather protection can be taken care of by common equipment and methods. Recording isn't a big problem. There is a good monitoring tool for recirculating the oil when b.s. and w. content is too high. And automatic samplers can cheaply and simply give oil gravity and b.s. and w. content.

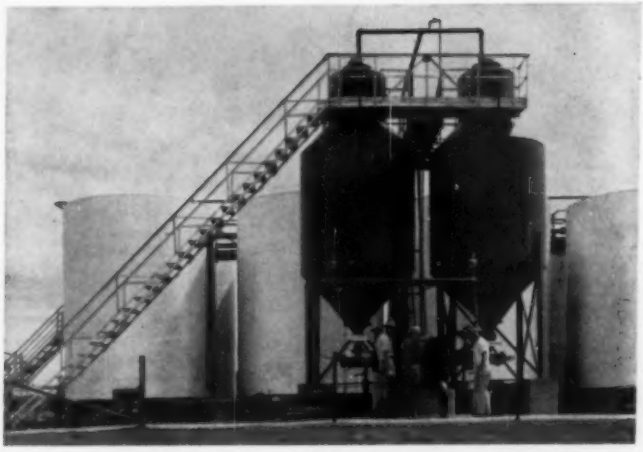
The problem that remains is to measure volume in a simple and economical way.

When can you use it? . . . If LACT is so good, the question is, "Under what conditions can I install it and get a payout?" There's no pat answer. Each lease has to be taken on its own merits. Here are some general rules to guide you. LACT will pay out when:

1. You are installing a new battery to run about 300 bbl. of oil per day or more.
2. You are replacing old tanks at



PAN AMERICAN PETROLEUM'S system is being used in southern Oklahoma and on the Texas Gulf Coast. Fig. 4.



PHILLIPS PETROLEUM'S system is being used in northern Oklahoma and the Texas Panhandle. Fig. 5.

a battery running more than 300 to 400 bbl. per day.

3. You can tie in with other automatic controls, automatic well testing, or the like.

4. You can reduce labor force or avoid hiring more labor.

Whose consent do you need? . . . So far, all LACT units have been installed only after both producer and pipeline agreed to it. In most oil states, that agreement is the only formality necessary. In others, LACT can be more of a problem.

For instance, in Texas there is a law requiring oil to be measured in a tank on the lease. Purpose of the law is to protect the royalty owner and aid in tax collection. And, on the face of it, the law seems to rule out p.d. meters. While the Texas Railroad Commission has granted exceptions to several companies to use p.d. meters on an experimental basis, it has not yet advocated changing the "in a tank" requirement generally. Commission members seem to feel that there will be plenty of time to change the law after p.d. meters, seldom used on leases before, prove themselves for that use.

And, thus far in Texas LACT units of all kinds have required a permit from the Railroad Commission.

Louisiana's Conservation Commission Order 29-B requires that seals be installed manually on all tank valves. But, there's no reason to believe that this order will not be changed as LACT becomes more commonly accepted.

How to Measure Volumes

There are three ways being used to measure oil volume in LACT. These are the positive - displacement (p.d.) meter, weir tanks, and dump tanks. Fig. 1 shows the principal types of systems now in use.

P.d. meters . . . Pipeline companies generally have more experience with p.d. meters than do producing companies. And, almost without exception, the pipeline companies prefer p.d. meters to other type LACT units. Many producers also prefer meters. This is because:

1. Both pipeline and producer can keep a close watch on accuracy of meters.

2. It is easy to allocate cost of a meter LACT system between producer and pipeline.

3. Duplicate meters can give a cheap, independent, and continual check of accuracy.

4. A meter system doesn't depend on floats or valves for its accuracy.

5. Paraffin deposition and corrosion are not problems with a meter.

6. A meter can be temperature-compensated so it isn't necessary to record temperature.

7. Meters lend themselves to printing systems.

8. Meters are small, light, and cheap.

Of course, meters also have disadvantages:

1. They must be proved periodically.

2. Free gas causes bad readings.

3. A meter must have relatively constant pressure and flow rate for best accuracy.

4. There are adverse laws in some states.

Because meters are small and light, they can easily be skid-mounted with other equipment so installation cost is lowered.

Proving meters is a chore. How big a chore it is depends on how many meters you have and how far apart they are. If you have only a few they are widely spread, proving each meter will be more expensive than if you have many in a small area.

Most companies use a simple system to keep constant pressure and flow rate on p.d. meters. They use a small centrifugal pump ahead of the meter and a back-pressure valve downstream of it. The back-pressure valve keeps meter pressure constant; since the pump is working against a constant pressure, it delivers a constant flow rate. Besides, pressure in the meter case is thus higher than at the pump suction so that no gas will break through and cause bad readings.

As an extra precaution, most put air eliminators and strainers ahead of the meters. Most solid matter settles out in the vessels ahead of the meter, but the strainer removes whatever is left. Thus, wear is seldom a serious problem.

Figs. 1 and 2 show a p.d.-meter LACT unit installed by Cities Service Oil Co. in the Texas Panhandle.[6]

Weir tanks . . . As you'd expect, the first LACT units were simply designed for doing automatically with lease tanks what was done manually before. To the tanks were added weirs, top and bottom, to make sure that the tank filled to the same height and pumped out to the same level each time. Such a weir-tank system has these advantages:

1. It makes use of existing equipment.

2. Tanks are the customary way of measuring oil.

3. Volume can be checked easily with hand tools.

THIS DUMP-TYPE UNIT is being employed in West Texas and elsewhere. Fig. 6.

4. Tanks are not affected by gas.
5. Tanks are not prohibited by law in any oil state.

Weir tanks also have disadvantages:

1. The system depends on floats and valves for proper, accurate operation.
2. Drawdown time may be long.
3. Paraffin deposits inside tank can cause inaccuracy.
4. Temperature must be recorded on every run.
5. Bottoms can build up in some tank systems.
6. More of light ends are lost.

Figs. 1 and 3 show the weir tank system operated by Gulf Oil Corp. in Kansas and in West Texas.[7]

Dump tanks . . . The dump tank, also called the metering tank or the dump meter, is not new. The idea has long been used in meter provers, well testers, metering separators, and the like. Generally, the vessel is built so that the top and bottom are quite small and the middle quite large. As a result, top and bottom levels can vary a lot without having much effect on the total volume delivered by the vessel. Such vessels have these advantages:

1. They use a simple, easily understood principle.
2. Drawdown is fast.
3. Accuracy is not affected by gas.
4. Little of light ends is lost.
5. Accuracy can be checked with hand tools.
6. The vessels aren't prohibited by law in any oil state.

While it gets around some of the objections to weir tanks, the dump meter still has some disadvantages:

1. Paraffin deposits can throw off accuracy.
2. Temperature must be recorded.
3. The system depends on valves and floats for proper operation and accuracy.

It is usual to plastic coat the inside of dump meters to prevent paraffin deposition. Moreover, some are designed to make corrections for temperature so that it need not be recorded. Some dump meters compare in size, weight, and cost very favorably with p.d. meters. Others are larger, bulkier, and more expensive.

Figs. 1 and 4 show the LACT unit designed by Pan American Petroleum Corp. and operating in southern Oklahoma and on the Texas Gulf Coast.[8] Fig. 5 shows the design of Phillips Petroleum Co. which is being used in northern Oklahoma and the Texas Panhandle.[9] Fig. 6 is another dump-type LACT unit used in West Texas and elsewhere.

Other Equipment

There is not now any cheap automatic instrument for sale which can accurately record b.s. and w. content satisfactorily. Most LACT units now operating make no attempt to make a continuous record of b.s. and w. Instead, they use the capacitance-type b.s. and w. monitor developed by Gulf Research & Development Co. This instrument is subject to drift and must be calibrated for the crude in which it is used. However, it is accurate enough to detect when b.s. and w. content gets above 0.5 (or some similar figure) per cent and to switch the stream back to the treating equipment.

Several devices have been made for measuring oil gravity automatically. Mostly, these devices have been supersensitive and delicate so that they were unfit for long-term field use. And, most were too expensive.

For lack of good, cheap automatic instruments, most companies simply use an automatic sampler. Samplers have given troubles too, but they are the best solution in sight for getting oil gravity and b.s. and w. content accurately enough for purposes of sale.

Relying on electric power . . . Certainly, you can get a lot more flexibility and simplicity into a LACT system if you have outside electric power than if you do not. For that reason, most LACT units thus far installed have been on leases with electric power.

Several designs have been made for LACT units to operate with no outside electric power. The Pan American unit in Fig. 4 is one of these. On this unit, the b.s. and w. monitor gets current from batteries, but all other operations are gas-operated and gas-controlled. However, where the oil is going to a pressure pipeline, Pan American has used electric-motor-driven pumps.

There are at least two ways an LACT unit without outside electric power could operate to deliver oil into a pressure pipeline. One is to use a continuously running engine-driven generator at the site. In such a case batteries could be used for standby. Another suggestion is to use a continuously running engine with its throttle tied to a float control in the LACT sump tank. When level in the tank is high, the engine's throttle opens wide and the attached pump runs at high speed. When level in the tank falls, the throttle pinches back and the pump runs slowly. Such systems have worked well in many areas on salt-water disposal systems.

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THOUSANDS OF DIAMOND-LIKE CUTTING EDGES

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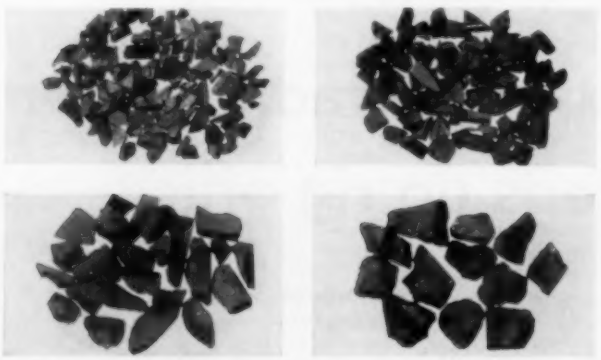
Stoody Composite Rods are supplied bare or flux coated for application by oxyacetylene torch. With their extraordinary welding properties, these rods are time-savers in application and cost cutters in the hole! Try Stoody Composite Rods on all your metal-cutting fishing tools.



FOUR PARTICLE SIZES and four carbide proportions in the rods are available to meet the requirements of any specific job. Screened and sized particles, each individually copper-plated for perfect tinning, may be had in bulk for those who prefer to make their own rods.

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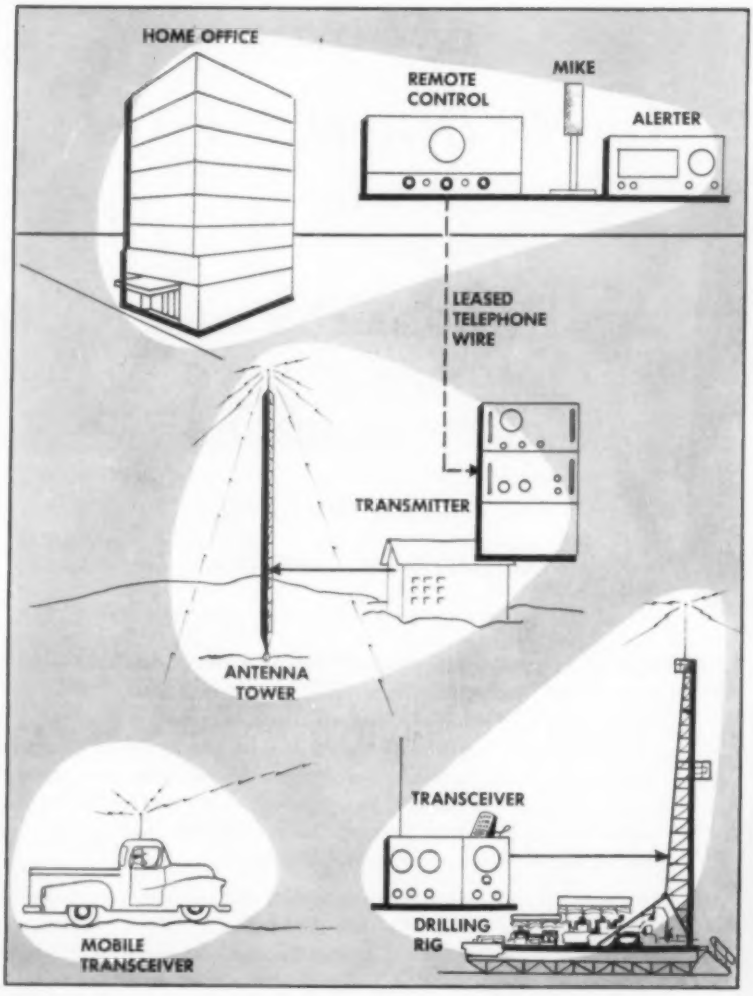


This diagram and the pictures at right show how . . .

Tulsa headquarters is in constant touch with rig-floor operations. Here Robert Reed discusses the results of a drill-stem test with Robert LaFortune, vice president of Reed Drilling Co. They decide to run pipe and advise . . .

Tool Pusher Frank Merrill at the rig, as Driller Bob Morris stands by. Tool pusher then checks with . . .

Two-way radio system steps up rig efficiency

By Norman S. Morrisey
Drilling-Development Editor

A LONG STEP forward in increasing rig efficiency by the use of a two-way privately owned radio system has been taken by Reed Drilling Co., Tulsa. The over-all result has been to reduce down time, save on gasoline and wear and tear on company cars, cut long-distance phone bills, and provide a much smoother field operation by close coordination between rigs and home office.

One of the most important functions of the two-way radio setup is the additional service to the operator, who has up-to-the-minute information on coring, drill-stem tests, shows of

Earl Clifford, office manager, before ordering casing. Telephone-type extension permits three-way conversation between rig and home office.

CAR AND RIG UNITS are interchangeable, compact, easy to handle, and are installed in a matter of minutes. Here Tool Pusher Frank Merrill is replacing the unit in his car.

oil in samples, etc. As a consequence, shut-down time while waiting for orders is held to a minimum, reducing the total cost of the well.

Many of the benefits are intangible, Robert B. Reed, president of the company, points out, and are difficult to evaluate in terms of actual dollars and cents saved. He does, however, point to the long-distance phone bills to show some tangible results. Prior to installing the two-way radio system, monthly phone bill was getting out of hand. Biggest single item was the daily drilling reports phoned in by tool pushers. Since the network has been in use, the monthly phone bill has been cut in half. Savings on the phone bill alone will pay for the entire installation in about 40 months.

Reed Drilling Co. operates in northern Oklahoma within 150 miles of the home office, Tulsa, and the six company rigs are spread out from the Kansas-Oklahoma line to the Seminole uplift. Three factors have made the two-way radio system a success:

- Base station antenna power of 250 watts.
- Antenna location.
- Frequency of 25.22 megacycles.

Two-way radio setup . . . The home office is connected to the base transmitter by a leased telephone line. The 350-ft. tower is located about 4 miles from downtown Tulsa atop Lookout Mountain, 400 ft. above the surrounding plains.

Three of the six rigs have a receiver-transmitter installed in the doghouse; cars driven by the tool pushers, the drilling superintendent, and the president all have identical units for two-way communication. The car and rig units are all interchangeable and can be quickly changed or swapped in the event of breakdown. In addition, one truck used for moving the rigs from location to location has a two-way radio.

Total cost of the installation is $17,500 with the tower and transmitter the biggest single item. Each car unit runs about $1,000 installed. The intangible benefits, of course, make the two-way system even more attractive.

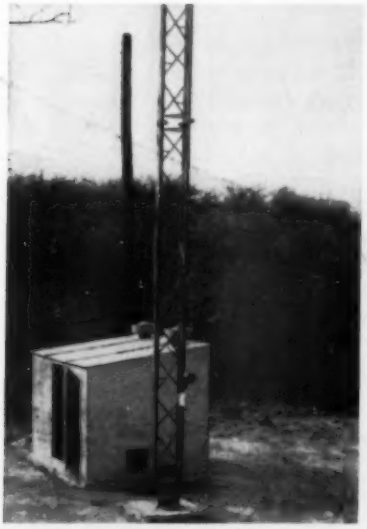
Reed cites one recent fishing job in Osage County where the rig was an hour's drive from the nearest telephone. Each phone call would have cost a minimum of 2 hours' lost time when a fishing tool was needed or some other piece of equipment had to be brought out to the rig. With the two-way radio on the rig floor, however, lost time was held to a minimum.

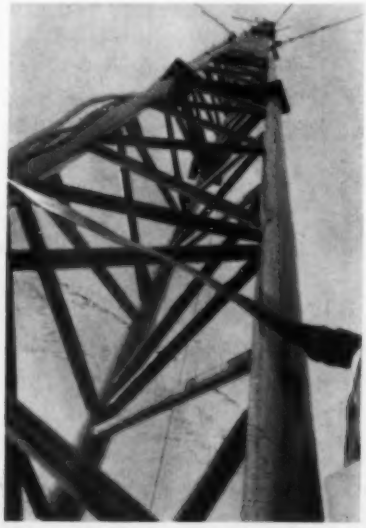
Frequently the rig gets too far from the home office for direct communication, particularly when radio transmission or reception is poor. This is not a great obstacle since the rig can invariably reach one of the other units and this unit in turn can relay the message to the home office.

Reed has rented space on the tower to another transmitting facility to help defray the cost of the installation.

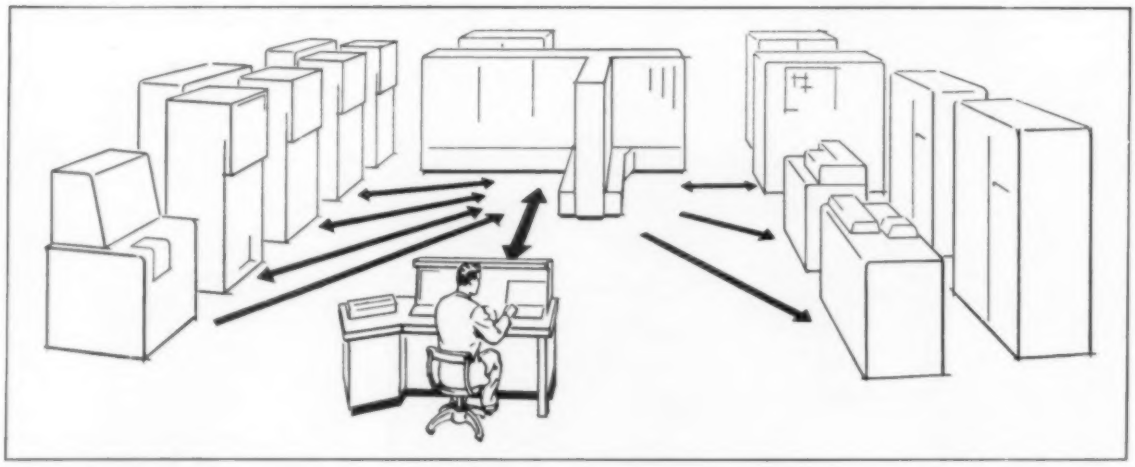
Although the radio network is primarily used for company business, FCC rules require that the system cease normal operations during Civil Defense alerts and monitor the conelrad frequency.

Occasionally the system is used for "Good Samaritan" work. Recently a tool pusher, W. R. Hooker, was on the way to a company rig when he saw the car directly ahead of him strike a bridge abutment. Hooker called the Tulsa office, which in turn alerted the Oklahoma Highway Patrol. The accident occurred on a lonely stretch of road and valuable time was saved getting an ambulance to the scene of the accident.





PROPER SELECTION of the base station and the 350-ft. tower insure optimum coverage throughout the company's sphere of operations.



Using this IBM 705 electronic computer . . .

New Cost-Control Methods are now practical for refining operations

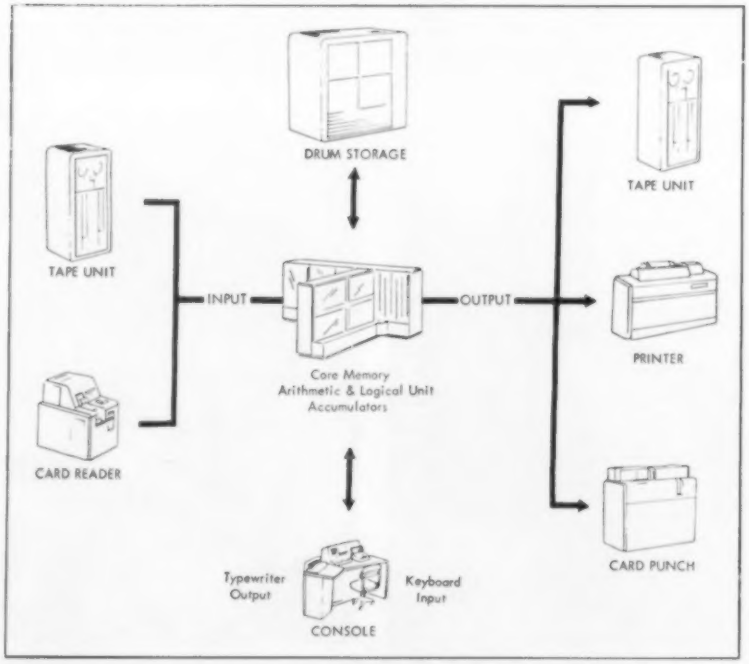
By J. W. Davie
and P. P. Entrikin

WITHOUT SUCH large-scale, high-speed data-processing equipment, the refinery can only test relatively high-cost operations or areas. Working with either new or more conventional cost-control methods, however, the computer-implemented program can often make a diagnosis of specific factors and recommend the best treatments.

An IBM 705 computer is used in the Baton Rouge refinery of Esso Standard Oil Co. to carry out these cost-control operations.

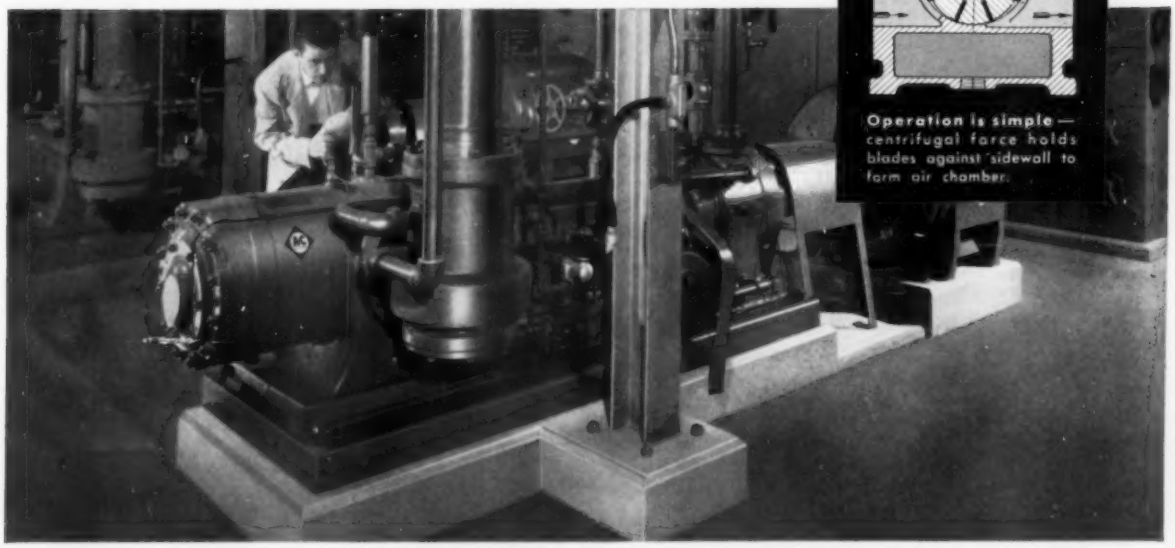
Conventional methods . . . Process-manpower cost data are handled by the computer. A preliminary manning report, produced by the machine, is sent to each unit each afternoon. It predicts the men that will be working at that unit during each shift next day. The foremen mark the corrections to these predictions, based on who actually works, and these corrections are fed back into the machine program to prepare the payroll record.

Material from paper presented at AIChE annual meeting, Chicago.



ORGANIZATION of 705's data transmission, showing operator's console.

Ro-Flo COMPRESSORS



Operation is simple—centrifugal force holds blades against sidewall to form air chamber.

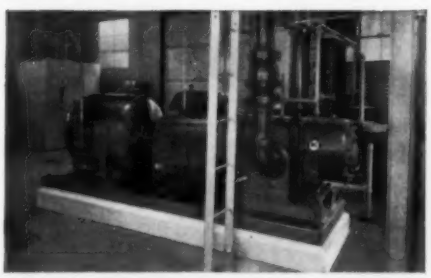
Ro-Flo units at a Midwest utility supply air for mixing with vaporized propane gas to meet an increased demand for natural gas.

No shake...no shimmy...no shock!

Rotary operation produces a remarkably stabilizing effect. You don't get the shimmy and shock inherent in reciprocating compressors.

Users in many industries have discovered that *Ro-Flo* compressors eliminate the cost of heavy foundations. A simple slab is enough. Smaller units are bolted directly to the floor. Automatic wear compensation at the rotor blades keeps compressor efficiency at high level even after years of use. There are only two wearing parts.

Ratings—Choose from twelve sizes of two-stage *Ro-Flo* compressors, ranging from 250 to 1800 cfm at pressures from 60 to 125 pounds gauge. Single-stage *Ro-Flo* units handle pressures up to 50 pounds gauge, and handle volumes from 40 to 3000 cfm.



Two-stage *Ro-Flo* compressor, installed in natural gas pipeline booster station. Unit provides make-up gas to help maintain line pressure for peak loads.

Mobile *Ro-Flo* compressors used on emergency equipment for fighting oil tank fires at a Texas oil storage area.

For complete information on Allis-Chalmers rotary compressors, ask for two-stage Bulletin 16B8244 or single-stage Bulletin 16B8126. Call your nearby A-C office or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.

Ro-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS

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A-5610

All this feeds into the personnel-records programs, and an accumulation of the labor cost is charged back against the unit. The absence record of each man is also obtained from these records.

Many maintenance and repair items are carried in refinery storehouse stock. A machine program maintains stock levels by processing stock issues and receipts, and writing a purchase order when the level of a particular item falls below an ordering point. A related program follows up on open orders and pays invoices. Issue and order data are subsequently used in cost accounting.

In the refinery-operations analysis setup, information is gathered daily about the operations of the process units, stock transfers, and inventories. Extensive use is made of "mark-sense" cards because the timing of some makes it impractical to key-punch from forms. The cards are marked by operators in control rooms, foremen, gagers, laboratory testers—hundreds of men in all.

The cards are delivered to the data-processing center at 5 a.m. each day. By these mechanized data-collection and processing methods, practically all of the information for cost-control studies and reports are readily available. Any type of finished report can be produced, either on a routine basis, or as a special study.

New Approaches

New cost-control work is being done with data from the operations-analysis program. The mark-sense cards, containing all pertinent process data, are run through mark-sense machines and turned into punch-card data which are subsequently fed to the computer. The first analysis of these data is for validity. For example, we have the output of one unit to compare with the input to a second unit. Through such balances, we are able to select rationally the best of several pieces of data.

In those cases where crosschecks by material balance are not possible, other criteria may be easily determined in each individual case.

Next stage of data analysis is preparation of final material balances around process units, sections of process units, and individual pieces of equipment. We are able to check these balances from a number of different standpoints.

The result of this "common sensing" of data is a set of values that more nearly represent what actually happened. Good balances will indicate the sources of process losses or measurement error. Consequently, this becomes an effective means of control insofar as the accuracy of the data and process losses are concerned.

Unit operating criteria . . . The next stage of data analysis is to calculate unit-operating criteria. These may be secondary variables which cannot be measured directly on the unit, as in the case of fluid flow in catalytic cracking units. These control points are flagged for further study, if they are at unusual levels.

In some instances a "performance index" may be calculated, comparing the operation of the unit against its best operation in past periods. These data are processed electronically into reports for distribution to the units early each day.

The final stage of data analysis, and one of the most important reasons for the project, is the feedback of information into the various scheduling programs, to keep them in step with reality.

In the laboratories, testers mark-sense standard prepunched cards with the results of their control tests. These cards can be used to improve the system of distributing the expenses of the laboratory, and to make better laboratory-efficiency studies and routine sample reports.

The machine program enables us to have nearly current data for inventory runs, to be used in profit-loss statements, tankage studies, stock control, evaporation studies, daily and monthly inventory reports, and other similar uses.

Study of facilities . . . Computers and new mathematical techniques can be used in allocating existing facilities and in the design of new units, using either stochastic or nonstochastic models. The stochastic model simulates in a computer program the logical rules which govern the input data and the variability in this input, the decision rules which are used by the planners or schedulers, and a mathematical simulation of time and equipment limitations.

The process variability is inserted randomly through distributions based on past experience. These models are then run through the computer to simulate long enough periods of time to assure their statistical match to existing conditions in the plant. Then new decisions rules or equipment changes are tested in the model.

For example, a new transfer line or a new tank is inserted into the model, to see whether this will relieve some of the existing limitations. In this fashion the problems of variability, which have never been very susceptible to calculation, can be handled in a quantitative fashion.

Similarly, the decision rules which management uses in deciding which order to fill first, or which ship or barge is more likely to arrive, and therefore which blend should be made first, can be tested in detail in the computer simulation. Better decision rules can be set out, and a better design basis for new transfer lines and surge tankage can be decided on. The resulting improvement in operations means lower cost.

Linear programing is perhaps the best known of the nonstochastic or steady-state models that we use. We have learned to use this method for the calculation of facilities over future periods of time, and are still learning more about the use of this technique in seasonal-storage and similar studies.

In the steady-state category are also the numerous models which predict yields from various processes under given sets of circumstances. These were "data book" correlations in the past, but now exist in the form of computer programs.

Production control and scheduling . . . Use of computers for these operations on a routine basis is, we believe, one of the major payout applications of computing equipment. The refining business is getting very complicated—chemical processes are being increasingly used to augment physical-separation processes. We have in addition to our fuel products an extensive petrochemical operation and a lube, wax, and grease plant. All these operations must be integrated to produce the best operating schedule for the refinery.

A computer program allows a refiner to determine an optimum operating plan which will meet requirements in the best possible manner. The computer program for such an optimum schedule should be quite flexible, to allow quick reaction to changed conditions, such as the Suez crisis, an unexpected shutdown of a major unit, or a major price break.

Any scheduling system should also have feedback, to make sure it "keeps its feet on the ground." All too frequently studies are made but not implemented because they either overlooked some aspect of reality in the situation, or they simply are not followed up in all the detail that is necessary. Now, much of the follow-up work can be done automatically by the computer system. Failure to concur with the schedule can be flagged and called to the atttention of management. **End.**

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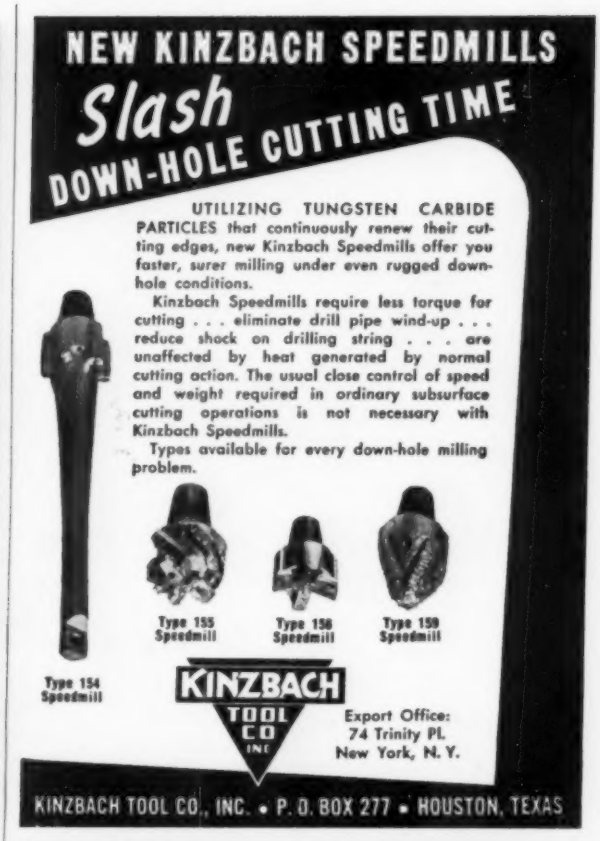
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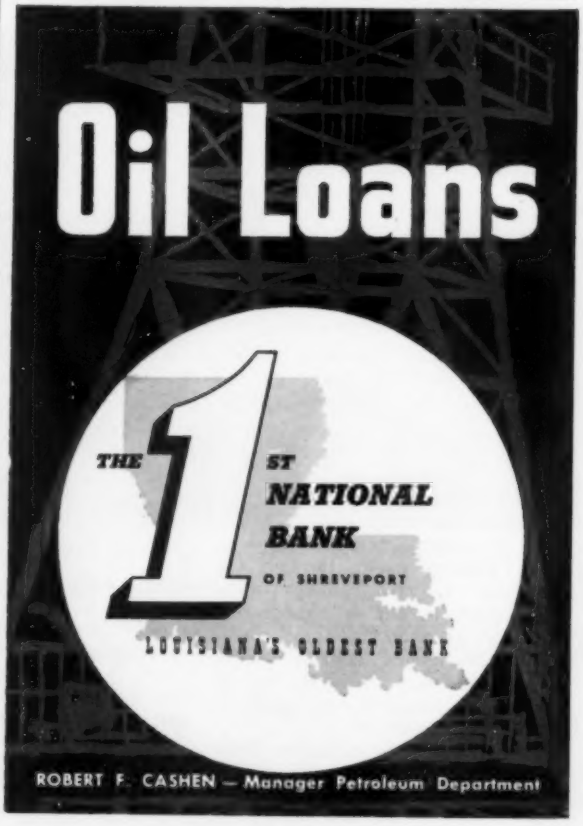
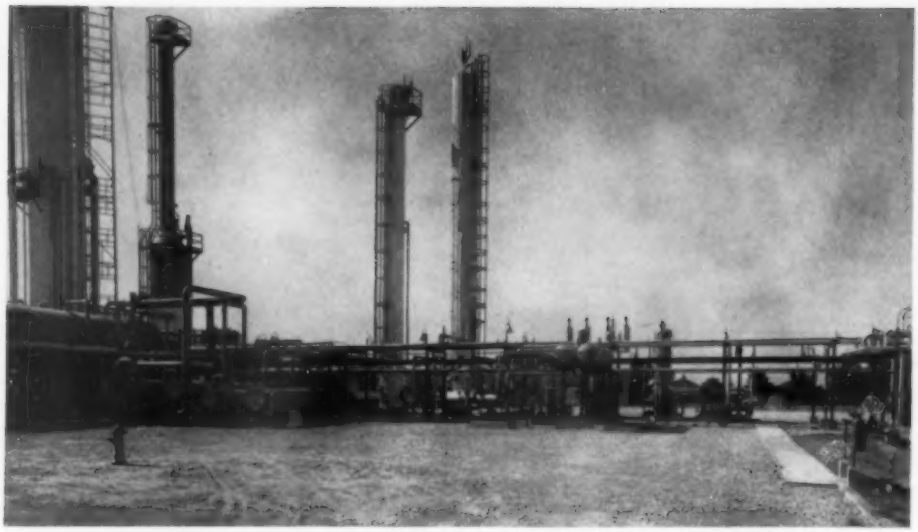




GRAVELED AREA around Cities Service's Wichita gasoline plant is being treated for chemical weed control.

Custom weed control gets the job done better and cheaper

By Dick Evans

WHO WOULD THINK you could kill weeds in a snowstorm? As blizzards started to sweep over the western plains last winter, our spray crews, operating under weed control contracts with leading oil companies, kept going until snow covered the ground. Landowners who laughed then made rueful comparisons come summer between the bare ground which had been sprayed and their own crops of sunflowers, bindweed, and thistles, which can hide a good-sized herd of cattle.

With modern chemicals much weed growth can be prevented before it starts. This was the reason for spraying before last winter's snow.

Custom weed-control contracts enable the oil industry to make more efficient use of skilled labor on its own payroll and provide professional help on specialized jobs which do not warrant a full-time company crew.

Professional Approach

Development of new chemical herbicides, resulting in part from the fast-growing petroleum-chemicals industry, has made it possible to take this professional approach to weed control.

The chemicals are "Telvar" weed killers, produced by Du Pont Co. These are organic compounds which attack growing plants through the roots, and also kill seedlings which may germinate for a considerable time after application. These chemicals fit the unique demands of the petroleum industry especially well in that they are nonexplosive, nonflammable, and noncorrosive.

Furthermore, they present no toxic

Author is president, Dick Evans, Inc., custom weed-control contractor, Wichita, Kans.

TABLE 1—ANNUAL COST ANALYSIS
(Per acre)

	Hand cutting "goosing" per acre	Hand labor plus machine per acre	Company applied chemicals per acre	Custom application of "Telvar" W Weed Killer by 5-yr. contract per acre
"A" Company (production)	$1,241.00	$889.00	$750.00	$261.00
"B" Company (production, access roads, Johnson grass, Mexican sandburrs, bindweed) 3 cuttings	987.00	850.00	.....	304.92
"C" Company *(refinery, gasoline plants)	1,066.50	600.00 (contract 3 cuttings)	.....	261.00

*At end of season heavy growth remained constituting fire hazard during winter months.

ANNUAL COST COMPARISON
(For firebreak around storage tanks)

		Hand and machine	Custom application of "Telvar" W Weed Killer by 5-yer. contract
100-ft.-diameter tank	(20-ft. band	$100.00	$45.25
	(24-ft. band	138.00	56.10
	(30-ft. band	189.00	75.39
112-ft.-diameter tank	(20-ft. band	108.00	49.76
	(24-ft. band	154.00	61.52
	(30-ft. band	212.00	80.34
115-ft.-diameter tank	(20-ft. band	718.00	51.65
	(24-ft. band	per acre	63.79
	(30-ft. band		83.13

NOTE: At $2.48 per hour labor cost $718.00 per acre
At 1.75 per hour labor cost 600.00 per acre

hazard to crews or livestock, either during treatment or afterwards. They can be applied close to agricultural land without risk of crop damage due to fumes. Their prime advantage in preventive weed control is that they can be applied before growth starts, even in a snowstorm, to prevent spring sprouting, so there is no dead growth to be cleared up after treatment. This means less fire hazard, less total cost, and neater looking property.

The payoff shows up in budget reductions amounting to 50 to 75 per cent annually, in 5-year records of several petroleum companies, summarized in Table 1.

These figures are based on experience during recent drought years. With the return of rainfall to the Mid-Continent area in 1957, natural vegetation has flourished, and the cost of control by conventional methods has been proportionately higher. But preventive chemical control costs no more before a rainy season than before a dry season. Even with the heavy rainfall of the 1957 summer, areas treated normally during the preceding fall, winter, and early spring, showed good control throughout the growing season.

Vegetation Is Problem

Many trends in the petroleum industry have made undesirable vegetation a more serious problem than ever before. High safety standards make the fire hazard of dry vegetation a major concern. Fire hazard due to weed growth is coming to be a factor in higher insurance rates. Weeds growing in pipe-storage yards and around metal equipment can increase corrosion of costly supplies and parts.

Oil installations in many areas are close to highways or business districts where good housekeeping is part of good relations with the community and the general public. Graveling has made weed removal by any means except chemicals almost prohibitively expensive.

In some areas, weedy areas around tanks harbor snakes which create an employe-relations problem, and another headache for safety engineers. Production departments of oil companies can become targets for farmers' complaints and possibly legal action under noxious-weed laws, if bindweed or Johnson grass grows on sites of producing wells or tank batteries.

And most petroleum companies are acquiring more and more land on which new facilities are being constructed—so the weed-control problem is multiplying both in area and in complexity.

The weed-control program provides:

1. Controlled application of proper chemicals at right season of year in dosage required for soil involved.

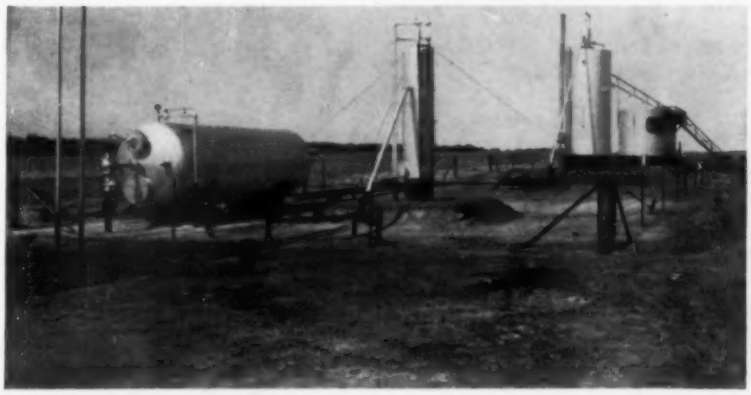
2. Technical supervision of application, a guarantee of results, and periodic reinspection for touching up spots of growth such as those resulting when the treated soil surface is disturbed by heavy equipment or routine operations.

3. A program for 5 years or longer to spread cost over an extended period and provide a basis for budget forecasting.

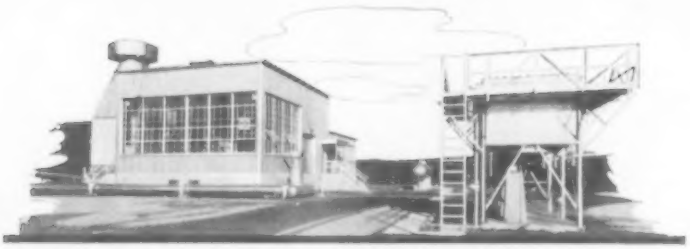
4. Full observance of legislative and insurance requirements, performance bonds where required, and a complete report to company officials and to public authorities where required.

OVERGROUND PIPE route was sprayed at Skelly's Eldorado, Kan., refinery.

THIS AREA was treated at the Phillips pipeline terminal at Wichita, Kan.



CHEMICAL WEED CONTROL was used on this Phillips lease in Stafford County, Kansas.



Perulack station . . . compact home of the turbine driven Cooper-Bessemer centrifugal shown.

Flexibility and high capacity gas transmission with Cooper-Bessemer Centrifugals...

HERE shown is one of the first of the modern Cooper-Bessemer centrifugals to go into operation on the Texas Eastern Penn-Jersey Transmission Corporation pipeline.

Four initial stations are being equipped with Cooper-Bessemer centrifugals, driven by 5000 HP Westinghouse turbines, to take gas from storage in Western Pennsylvania to densely populated areas on the East Coast.

Ability to meet peak demands is a keynote. This design flexibility, plus extreme compactness and simplicity of these Cooper-Bessemer centrifugals, pays big dividends in modern gas line operations.

Adaptable to any type of power unit, Cooper-Bessemer centrifugal compressors are ideally suited to economically handle the most demanding gas pipeline service requirements.

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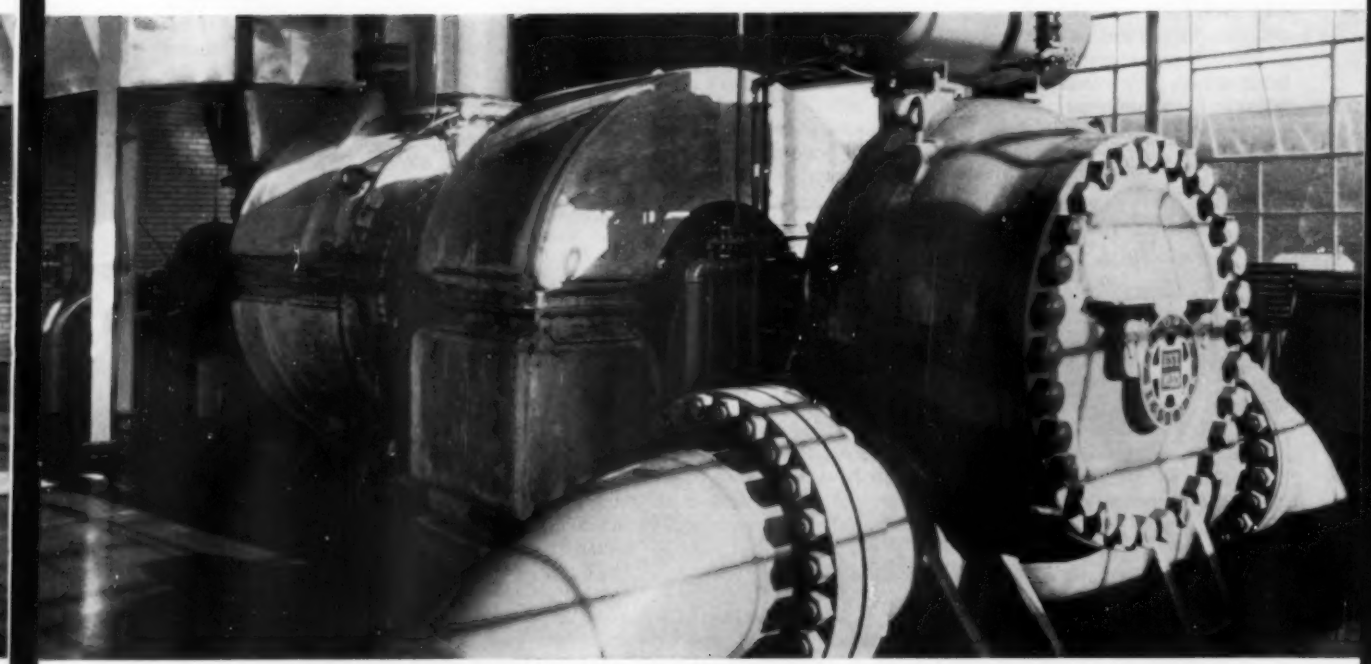

Cooper-Bessemer RFB-24 centrifugal compressor installed in the Perulack, Pa. station on the Texas Eastern Penn-Jersey gas transmission line. This unit is driven by a 5000 HP Westinghouse gas turbine.

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ELEMENTS OF FIELD PROCESSING—46

A look at Energy Terms

By Dr. John M. Campbell
University of Oklahoma

THE BASIC ENERGY EQUATION, $\Delta H = q - w$, developed in Part 45, involves terms that are usually expressed in different units. Consequently, these terms must be converted into the same units before they may be added or subtracted.

In English units, work (W) is normally measured in foot-pounds, heat transfer (q) in B.t.u.'s, and enthalpy (H) in B.t.u.'s per pound, where a B.t.u. is the amount of heat necessary to raise the temperature of 1 lb. of water 1° F. The standard conversion between these units is:

$$1 \text{ B.t.u.} = 778 \text{ ft.-lb.}$$

The first law could then be stated in unit form as:

$$\text{(B.t.u./lb.) (lb.)} = \text{B.t.u.} - \text{(ft.-lb./778)} \quad (1)$$

where the second term on the left-hand side is the number of pounds in the system under consideration.

Equation 1 may be solved after making the conversions shown, but it is still not in the form usually needed. The systems encountered on the lease are flowing systems, and thus rate of energy transfer is the most convenient way of handling the equation. This is particularly convenient, for we seldom measure work, but rather express its equivalent in terms of power. Power is the time rate of doing work or the rate at which work is done.

In thinking of mechanical power and heat transfer, one should remember that they are really equivalent, for work may be converted into heat or vice versa. They may be expressed in equivalent terms, therefore, even though their normal units are different. It follows, then, that heat may be expressed in terms equivalent to either work or power, the only difference being that the latter expression must contain a time unit.

Power is most commonly expressed in terms of horsepower for pumps and compressors, with kilowatts being used for electrical devices. The most common time unit is the hour, since flow rates are usually measured per hour in process calculations, and heat transfer in B.t.u. per hour. The following conversion units are therefore particularly useful:

$$1 \text{ hp.} = 1.98 \times 10^6 \text{ ft.-lb./hr.} = 2{,}545 \text{ B.t.u./hr.} = 746 \text{ watts} = 0.746 \text{ kw.}$$

$$1 \text{ kw.} = 2.655 \times 10^6 \text{ ft.-lb./hr.} = 3{,}410 \text{ B.t.u./hr.}$$

With these conversion factors, one may then solve the basic equation regardless of how the terms are expressed.

When expressing q and W in power units, it is necessary also to multiply the left-hand side of the equation by the rate at which the system is flowing in pounds per hour. Inasmuch as flow rates are normally expressed in volume terms, a conversion is necessary to pounds per hour.

For hydrocarbon liquids:

$$\text{lb./hr.} = 350 \text{ (bbl./hr.)} \times [141.5/(131.5 + {}^\circ\text{API})] \quad (2)$$

For gases:

$$\text{lb./hr.} = 76.4\text{G (M.c.f./hr.)} \quad (3)$$

Where: Bbl./hr. = 42-gal. bbl. per hr. G = specific gravity gas (air = 1.0). M.c.f. = thousands of standard cubic feet of gas measured at 14.65 psia. and 60° F. Specific gravity of oil = [141.5/(131.5 + °API)] (water = 1.0). °API = specific gravity of liquid expressed as °API.

It is now possible to solve for any term of the flow equation, once the other two are measured or calculated. When measuring or calculating work or heat, it is necessary to find the actual amount of energy absorbed or lost by the system. For example, when compressing gas one may find the horsepower of the driving engine, that transferred to the compression cylinder and the actual work done on the gas. Each successive amount of power is less than the previous link in the chain, due to friction and inefficiency. Of these numbers, only the latter one is suitable for use in the balance—the actual power absorbed by the system. The same is true of the heat term.

Example: 1,000 M.c.f. per hour of 0.65-sp.-gr. gas are compressed from 80° F. and 40 psia. to 120 psia. and subsequently cooled. Calculations show that 1,500 hp. was expended on the gas, the heat load in the cooler being 3,000,000 B.t.u. per hour.

Determine the enthalpy change in B.t.u. per pound:

$$\text{lb./hr. gas} = (76.4)\ (0.65)\ (1{,}000) = 49{,}600 \text{ lb./hr.}$$

$$(\Delta H)\ (49{,}600) = -3{,}000{,}000 - (-1{,}500)\ (2{,}545)$$

$$\Delta H = 820{,}000/49{,}600 = 16.5 \text{ B.t.u./lb.}$$

Note that work is shown negative, since it is performed on the system; and q is negative, since heat was removed from the system.

In reality, the solution of the balance is the easiest part of most problems, the real difficulty being to evaluate the individual terms. This is because work and heat are incomplete differentials, and their quantity depends on the process used in addition to the initial and final conditions. This places one in somewhat of a dilemma, for it is difficult to measure or even analyze the many complex processes that go on inside machinery. It is for this reason that enthalpy is usually calculated, and, in turn, used to determine work and/or heat.

Another help is to divide the process into sections for calculation, so that work or heat is zero, or negligible in each section. ΔH then equals q or $-W$. Calculation of ΔH then enables one to find q or W from ΔH, as shown in Fig. 1, for a simple compression

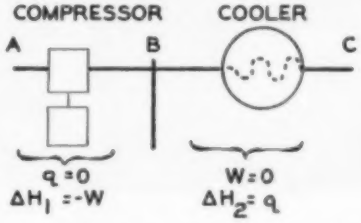

ILLUSTRATION of a subdivision of a process for calculation purposes. Fig. 1.

system. In the compressor, q is assumed equal to zero. Some heat transfer actually takes place, but it is negligible in comparison to the work term, and such assumption introduces no appreciable error. Any process such as this where $q = 0$ (or nearly so) is classified as an adiabatic process.

The total ΔH for the process shown in Fig. 1 is equal to the algebraic sum of ΔH_1 and ΔH_2, bearing in mind that ΔH_2 is negative, since heat is removed from the system.

The calculation of these quantities and their application to common lease processes will be discussed in forthcoming installments. **End.**

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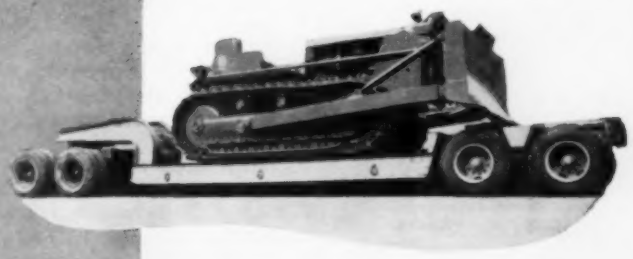

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Polynomials replace tables in Engineering Calculations

By John M. Ryan
Manager, Dallas District
The Datics Corp.

"In the design and operation of equipment to produce, refine and transport petroleum products, it is frequently necessary to refer to rather bulky tables. Table lookup is not an operation which an electronic computer performs economically. When engineering calculations are to be placed on a computer, therefore, it is usually desirable to find means of avoiding this operation."

THE MOST common method of eliminating table lookup is to fit a polynomial to the data of the table. Suppose calculations involving the supercompressibility of a natural gas were wanted. After investigation, a polynomial of the third degree in temperature and the fourth degree in pressure might be chosen. The problem is to determine the coefficients in the polynomial:

$$Z = a_0 + a_1T + a_2T^2 + a_3T^3 + a_4P + a_5TP + a_6T^2P + a_7T^3P + a_8P^2 + a_9TP^2 + a_{10}T^2P^2 + a_{11}T^3P^2 + a_{12}P^3 + a_{13}TP^3 + a_{14}T^2P^3 + a_{15}T^3P^3 + a_{16}P^4 + a_{17}TP^4 + a_{18}T^2P^4 + a_{19}T^3P^4 \quad (1)$$

Unfortunately, straightforward attempts to apply standard least-squares - regression techniques are foredoomed to failure. The reason for this failure may be seen from an examination of the mathematics by which the values a_i are found.

The a_i terms are usually determined so as to minimize the sums of the squares of the deviations of predicted values from the actual values. Changing notation for simplicity, the problem then is to find a_i values such that:

$$\phi = [Z-(a_0+a_1x_1+\ldots+a_nx_n)]^2 = \text{minimum} \quad (2)$$

If the partial derivative of ϕ is taken with respect to each of the a_i and the results equaled to zero, we can develop the usual least-squares set of simultaneous equations.

Now suppose that x_1 and x_2 were linearly related, i.e., that $x_1 = cx_2$. In this case, the second equation is an even multiple of the third. No solution exists. Thus the set of equations from Equation 2 has no unique solution for the terms $a_1, a_2, \ldots, a_n$ if two x_i values are linearly related.

The above fact bears on the solution of the normal equations resulting from Equation 1. The third-degree terms in T are closely related in a linear manner to the first-degree terms. The P^3 terms are closely related to the P terms. By the same token T^2 is highly correlated with T^4 and P^2.

Although no perfect linear relationship exists, the extent of linearity is probably sufficient to render useless any standard computer routine used to solve equations of this nature. This situation has been overlooked at any time or another in the computer installations of many of the larger petroleum companies. It was frequently assumed that the routine was inadequately checked out or that the computer was making an error.

The procedure for obtaining proper values of a_i cannot be detailed here. In general, however, it involves a substitution of variables so that the normal equations may be solved. After the solutions are obtained, a back solution is made to obtain the values a_i. These constants then may be stored in the machine's memory to take the place of a large table.

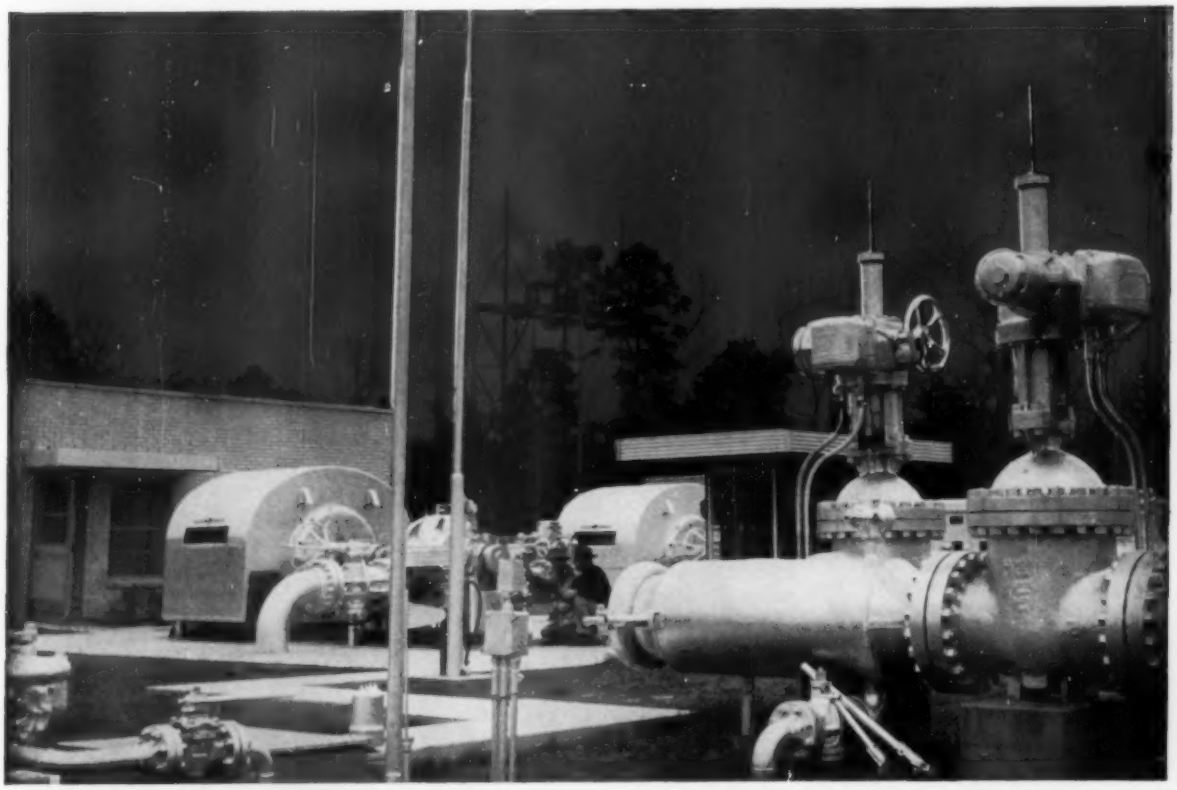
It should be observed here that it is unnecessary to use the least-squares technique in determining the polynomial to be used. An entirely different approach is to fit a rational polynomial using the Chebyshev technique. The Chebyshev approach is to determine the coefficients of a polynomial so as to minimize the maximum deviation of the predicted from the actual values. This procedure is much less common than least squares, much more satisfactory for engineering purposes, and usually much more difficult. A large percentage of the computer subroutines for transcendental functions use polynomials fitted by the Chebyshev criterion. The major advantage is that the maximum possible error is known in advance.

Acknowledgments

For a valuable explanation and application of this procedure to petroleum data, see M. J. Goodwill, E. Gordon, and J. W. Paylor, "Machine Computation of K-Values," Seattle meeting AIChE, 1957.

See the interesting book on this subject by Cecil Hastings, Jr., Approximations for Digital Computers, Princeton, N. J., Princeton University Press, 1955.

PIPE LINE PUMPING MAKES WONDERFUL CHANGE WITH ELECTRIC POWER



Operated by Remote Control

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Description and specifications on request . . . Brochure B

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Here's how . . .

Rotary Air-Displacing Compressors

Are used in the refinery

AIR POWER was first used by men as it existed in nature to propel sailboats, drive windmills, and do similar work. It was soon discovered that air under pressure could be put to work. An interesting development to save physical work was that of compressing air for the reed type of musical wind instrument, which later became the pipe organ.

In the seventeenth century it was discovered that air had weight and was compressible. Its practical use in a compressed form started at that time. The first compressor constructed in the United States was in 1865. Since then, development of the compressor and extension of its uses in every field of industry have brought this class of equipment to the place where it is one of the most important mechanical appliances in the refinery.

The earlier compressors were of simple design and construction, operated on low pressure, and were very inefficient. The modern compressors are relatively efficient and have become complicated pieces of machinery of one, two, or more stages, often used at very high pressures.

In the refinery, compressors are used in practically every application for which they are built, including air drills, tires, motors, and for starting the larger internal-combustion engines. Of more importance is the application of compressors to compressing refinery gases.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co.

Refinery compressors . . . The primary purpose of most large machines is to move refinery gases from a low-pressure area to a high-pressure area. A good example of this type of service is the use of compressors to move low-pressure gases from the cracking furnaces at steam cracking units to relatively high-pressure fractionating equipment in a chemical-product area. Another example is the use of the compressor to move low-pressure gases from pipe stills to high-pressure fractionating units in the light-ends department.

Another very important use of compressors in the refinery is in refrigerating systems. In this case, the compressors are used to recirculate a refrigerant gas from a low-pressure area and apply enough pressure in one or two stages to condense the gas into a liquid form. The liquid is then permitted to expand into a gas and circulate back to the suction of the compressor. Cooling is usually used to help condense the gas.

In addition, compressors are used to supply a reliable source of dry air to operate process-control instruments. The compressors are also used to supply high-pressure air which is used in mechanical or process operations through the refinery.

Classification . . . Most of the smaller units, up to a total of 4,000 to 6,000 lb., are either stationary or are made portable on truck or tractor units. For each type there is a similarly constructed pump for liquid purposes.

Rotary Compressors

In rotary compressors, force is given to the gas or air by a rotating impeller. There are two types, the displacement and the turbine type.

Rotary displacement . . . Rotary-displacement air compressors comprise a group of small compressors designed for moderate pressures and operating at various speeds from moderate to high. These compressors usually have one or more rotating parts fitted closely within a circular or partly circular casing.

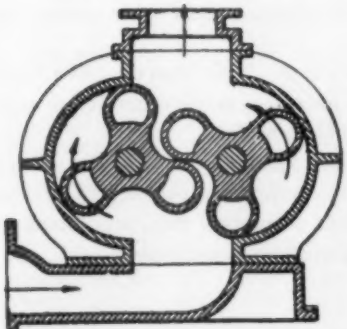
Designs of rotary compressors are numerous and there are many modifications of the rotary principle.

Two rotary compressors are shown in Figs. 1 and 2. This type of compressor resembles the geared type of liquid pump that has been in common use for many years. It consists of two wide-face, comparatively long-tooth spur gears which fit closely within a casing. The close fit, together with accurately fitting bearings, forms an air seal for the moving gears.

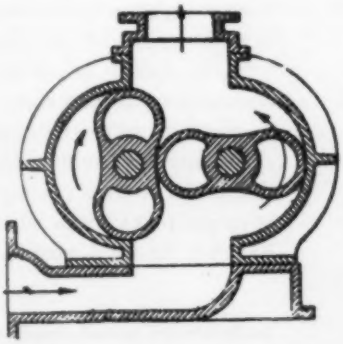
Air or gas may occupy all of the space between the teeth except where they are in mesh. When the gears are rotated, air enters at the opening in one end of the casing. As the gears rotate, this air is trapped between the two teeth and the sides of the casing. The air is then carried around with the gear until it is compressed and forced out of the discharge port by the meshing of the teeth of the two gears.

The action is continuous and in one direction so that no inlet or discharge check valve is needed to prevent the air leaking back to the intake. A check valve may be placed in the discharge line to prevent the air leaking back when the machine is shut down. Stuffing boxes are provided at the shaft to prevent air leakage at that point.

The principle of the tooth gear is apparent in Fig. 1, where the two rotors have three teeth or lobes each.



THREE-LOBE rotary displacement air compressor. Fig. 1.



TWO-LOBE rotary displacement air compressor. Fig. 2.

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SALES OFFICES: **Eastman Chemical Products, Inc.,** Kingsport, Tennessee; New York City; Framingham, Mass.; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle; Denver; Spokane; Phoenix.

By W. L. Nelson, Technical Editor

Salt Content of Crude

What is a reasonable amount of salt in a crude oil? We are receiving a crude oil that sometimes contains over 120 lb. of salt.—S. Wm. T.

The amount of salt contained in a crude oil is intimately related to the field conditions under which the oil is produced. Much brine is produced from some wells or formations and scarcely any from others. Viscous or low-gravity oils tend to hold brine in suspension, but somehow this factor is seldom noted in practice (low-gravity oils often contain only a small amount of salt). Finally, some brines are rich in salt, whereas others are nearly pure water. The brine in Venezuelan crude oils is quite low in salt (see Fig. 1), whereas some Oklahoma and Mid-Continent brines are almost saturated with salt.

All of these factors tend to cause great variations, so great that adequate correlations cannot usually be obtained, and averages are of little value. Even the consistency that appears in Fig. 1 is not real, because the points for the Venezuelan curve are already the averages of many samples, and the curves for West Texas, New Mexico, and Oklahoma are for shipments received by three refiners in these regions. However, Fig. 1 at least indicates that salt content and b.s. and w. content are closely related, and in a generally consistent manner. The logarithmic scales are used only to permit a large range in scale. They have no mathematical significance. Most major pipelines limit the b.s. and w. to 0.1 per cent because the purchaser does not want to buy or pay for the transportation of brine. Thus, in nearly all instances pipeline crude oils contain less than 100 lb. salt per 1,000 bbl. The following averages are of little significance because of enormous variations (zero to 2,580 lb. salt) but they permit in some instances a most general comparison. More than 450 samples have been tabulated (see references) but they cannot be presented here. Table 1 indicates some of the averages. In general, the oils received by refiners will be lower than the averages of Table 1 because many of the samples are for wells before field treatment. Gravity should have some effect on salt content but Table 2 does not show a clear relationship.

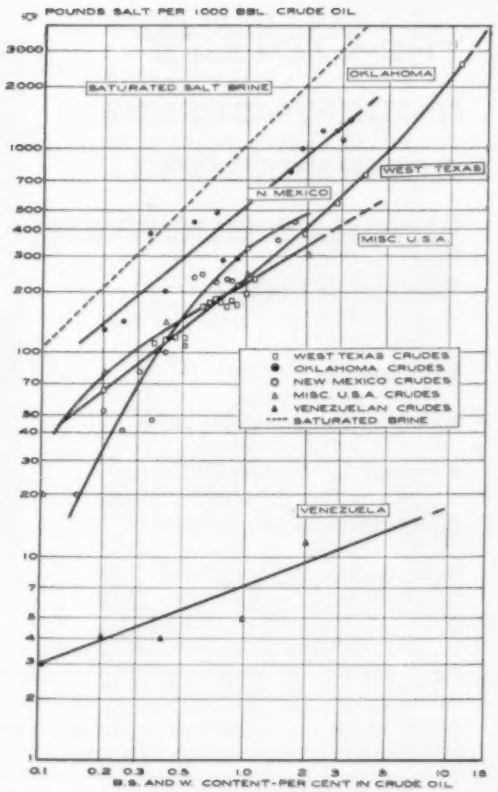

Fig. 1—Salt content as a function of b.s. and w. in crude oil.

TABLE 1
Average Salt Contents (lb. per 1,000 bbl.) for Some Types of Crude Oils

Oil or source	No. of samples	Salt content Av.	Salt content Rg.
West Texas	173	261	4-2,580
Grayburg	7	519	52-1,230
San Andres	24	443	10-1,233
Yates	10	435	65- 780
Clear Fork	13	277	62- 884
Ellenburger	9	216	10- 452
Devonian	7	123	4- 360
Delaware	5	12	4- 20
Schedule C	58	381	5-1,233
Schedule D	16	185	4- 884
Schedule A	17	149	5- 452
Venezuela	124	10.9	0- 63
Eastern	81	11.3	0- 63
Western	43	10.2	0- 55
USSR	4	343	155- 484
Canada	14	*200	*10- 865
California	5	115	17- 239
Mid-Continent	21	81	7- 200
Kansas	9	70	7- 305
Gulf Coast	11	35	2- 70
E. Texas field	5	28	9- 44
Middle East	9	*8	*1- 25
Wyoming	8	5	1- 13
Pennsylvania	6	0.8	0- 1
Pipeline crude oils	22	80	0- 235
Others	89	...	.....
Total samples	457		

*Samples with very high salt content not included.

References

1. Author's files.
2. Petreco Electric Desalting Bulletin (28 samples).
3. Martinez and Hurst, Fresh-Water Fracturing in the Permian Basin, Pet. Engineer, December 1956, p. B-68 (101 West Texas samples).
4. (8 Canadian samples) The Oil and Gas Journal, June 23, 1949.
5. Dickey & Sorg, Direct Electrometric Titration, Pet. Refiner, November 1948, p. 118 (45 samples).
6. Samuelson, G. J., Pet. Engineer, December 1954, p. C-31.
7. Anon., Chemical Desalting, Pet. Refiner, September 1954, p. 248 (17 samples).

TABLE 2—Salt Content (Lb. per 1,000 Bbl.) versus API Gravity of Crude Oil

API	Venezuela (all)	Eastern Vene.	Western Vene.	West Texas	Canada
12.5	2.5	...	2.5	...	690
17.5	19	25.0	15.3	...	580
22.5	17	27	4.4	...	470
28.0	5.1	2.3	7.6	230	...
32.5	15.4	13.7	23	534	...
37.5	8.4	7.4	19.7	364	120
42.5	7.5	7.5	...	211	21
49.0	4.7	2.5	7.0	...	...
Average	10.9	11.3	10.2	261	200
No. of samples	124	81	43	173	14

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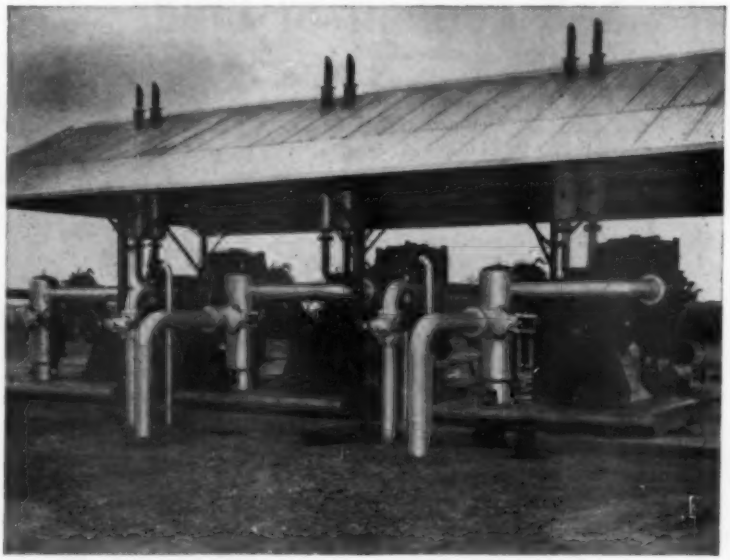

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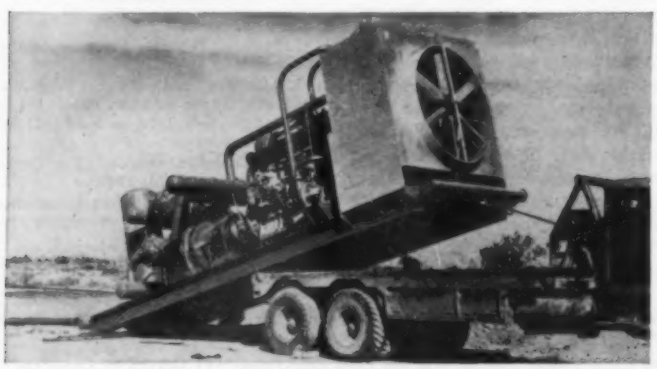

Joy WNB-114 Gas Compressor unloading onto a concrete pad. Inlet pressure 5 psig; discharge 150 psig. Capacity 2MMCFD.

Joy WGB-110 Gas Compressor installation. Inlet pressure 150 psig; discharge pressure 500 psig. Capacity 1.028 MMCFD.

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Among the

Drilling Contractors

Houston Contracting Company Revamps Organization In Expanded Exploration and Development Program

The former Chessher, Sutton & Davis Drilling Co., of Houston, has completed a corporate reorganization under the name of Timberland Exploration Co.

Reorganization follows retirement from the company last year of J. B. Davis, one of the original owners, and purchase of his interest in the company by the remaining owners.

H. G. Sutton, Sr., of Colmesneil, East Texas, continues as president in the new organization. H. G. Sutton, Jr., Beaumont, is vice president in charge of production; Erwin E. Grimes, vice president in charge of exploration; B. M. Sutton, general manager and drilling superintendent; and Alton N. Jones, office manager. Weaver Chessher, president of Chessher-Sutton, Inc., construction firm, is a director.

Headquarters remain in San Jacinto Building, Houston, where Grimes, B. M. Sutton, and Jones are located.

The change in name of the company was made to reflect more adequately the company's expanding activities in exploration and development of its own properties. These activities are in addition to contract drilling which the company will continue with its three operating rotary rigs.

Plans of the company call for a stepped - up wildcatting - development program, including the drilling during 1958 of 22 wells for its own account, compared with 14 drilled in 1957.

The company began in 1952 as McDonald-Davis Drilling Co., and operated under that name until 1954, when H. G. Sutton, Sr., acquired a major interest and became chief executive with the name of the company changed to Chessher, Sutton & Davis Drilling Co.

Until about 2 years ago, the company operated primarily as a drilling company, but since has formed an exploration department and actively engaged in seeking its own production. In this time, it has discovered two fields and extended the producing areas in two others. In 1957, it completed 8 producing wells out of the 14 it drilled for itself. In the previous year it got 2 producers from 11 wells drilled.

In addition to drilling and production activities, the company operates

OFFICERS of newly formed Timberland Exploration Co. are: H. G. Sutton, Sr. (seated), president; and (standing, left to right) Alton N. Jones, office manager and accountant; Erwin E. Grimes, exploration vice president; B. M. Sutton, general manager and drilling superintendent; and H. G. Sutton, Jr., production vice president.

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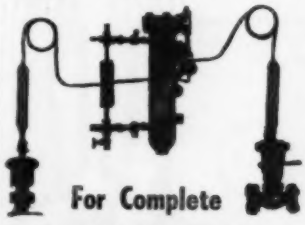

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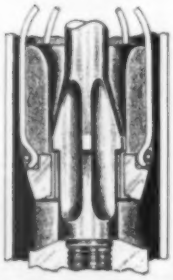

Cup position when going into hole.

Fig. 1

OIL STATES SWAB CUPS
The free pivoting wire, as shown in Figs. 1 and 2, allows the cup to respond to the lightest loads and, at the same time, lift the heaviest loads — NO BENDING OF WIRES REQUIRED!

Cup position when coming out of hole under load.

Fig. 2

OPERATORS EVERYWHERE ARE SWITCHING TO OIL STATES SWABS

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four small gas-gathering systems in East Texas-Gulf Coast fields.

Tool pushers supervising field operations are: Eddie Stevens, at Deweyville; J. E. Payne, Saratoga; and Harry Frederick, Mauriceville, all in in southeast Texas.

Pat J. Stewart Drilling Co., Wichita Falls, Tex., recently completed the drilling of six shallow wells in Northwest Healdton field, in Carter and Jefferson counties, Oklahoma, for Christie-Stewart Production Co. More recently, it has been drilling for its own account at 1 Griffin, a 2,000-ft. test in 29-2s-1w, Cotton County, Oklahoma, and for Pickett Brothers and itself at 1 Graves, a 2,500-ft. test in 31-6n-8w, Grady County.

Kilroy Drilling Co., Houston, has a deep wildcat operation starting in northern St. Martin Parish, South Louisiana. It is a contract job for Texas Eastern Transmission Co. at 1 Ozenne, in 52-8s-6e. Location is about 3½ miles north of Cecilia field, which has one 12,000-ft. oil well, completed in October 1956. Texas Eastern is planning to carry the hole to 12,000 ft., or below.

Kron-Salter Drilling Co., Houston, has a new deep-drilling job 6 miles east of Napoleonville, in eastern Assumption Parish, southeastern Louisiana. It is a 12,000-ft. wildcat test for W. H. Hudson at 1 Clifton and others, in 58-13s-15e. Location, about a mile from the St. James Parish line, is 2½ miles southwest of Burton field, nearest production, in the latter parish.

Crow Drilling & Producing Co., Shreveport, is putting down a 9,000-ft. test for A. R. Temple, of Biloxi, Miss., at a wildcat location a mile east of Neely, in Greene County, southeastern Mississippi. Temple's objective is the Lower Cretaceous sections. His test is at 1 Tatum, in 6-2n-7w.

Buckalew Drilling Co. has contract for a 7,000-ft. wildcat in eastern San Miguel County, northeastern New Mexico. The well is a Capital Petroleum Co. job on the Hampton Ranch in NW NW 9-13n-30e, 10 miles north of Tucumcari. Well site is on the southeast flank of the Canadian surface anticline, a possible gas discovery area. This is the third deep wildcat to be located in this county in recent months.

K. L. Kellogg & Sons, Compton, Calif., is getting started on the projected 13,000-ft. Stevens test they have contracted to put down for The Texas Co. in the old, shallow Buttonwillow gas field, in Kern County, California. The field, opened in 1927, was the state's first commercial gas field. It now has only one well, productive from a 3,400-ft. sand. Texaco's test, a joint venture with Standard Oil Co. of California, is its 1 Stutsman. Location is in 6-28-23. It is about a mile from the gas well, drilled by Standard in 1949 to 13,614 ft.

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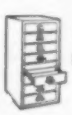
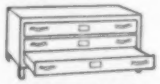


Model E-28 Electric Log Cabinet



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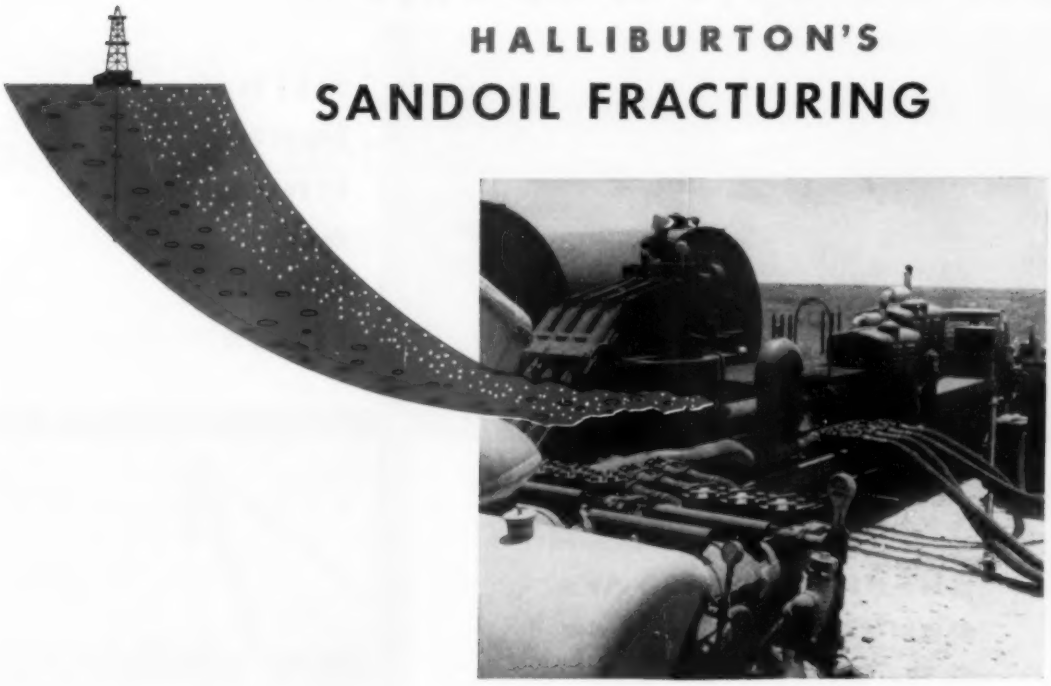

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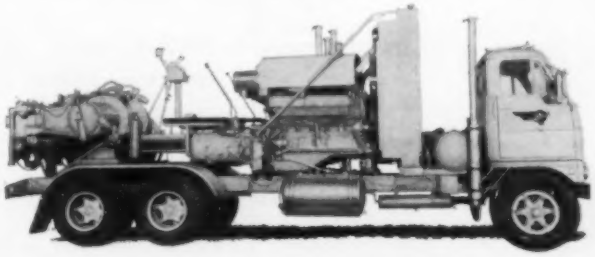

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Syd E. Culbertson Co., Inc., Box 9186, Houston.

D

Deck Road Boring Co., 2645 Baldwin, Corpus Christi, Tex.

Dunn Bros., Inc., Box 5771, Dallas.

E

Ebasco Service, Inc., New York.

Jess Edwards, Inc., Drawer 1091, Corpus Christi, Tex.

F

Flanders Concrete Coating Corp., Box 12188, Houston.

G

General Aerial Surveys, 4927 E. Admiral Place, Tulsa.

Geophoto Services, Inc., 305 Ernest and Crammer Building, Denver.

Gulf Coast Pipe Coating Corp., Box 2091, Houston.

Gunite Concrete & Construction Co., 1301 Woodswether Road, Kansas City 5, Mo.

H

Hill Hubbell & Co., 3091 Mayfield Road, Cleveland.

Horizontal Holes, Inc., (Road Boring), 2902 Ricks Road, Houston.

Hoss Heavy Haulers, WMAL Building, Laurel, Miss.

Huddleston Engineering Co., 511 E. Thirteenth Street, Bartlesville, Okla.

Hunsaker Trucking Contractor, Inc., Box 97, Dallas.

I

Industrial X-Ray Engineers, 115 Belmont Avenue N., Seattle.

Industrial X-Ray, Inc., 79 Herricks Road, New Hyde Park, N. Y.

K

Kansas City Pipe Coating Co., Box 254, Overland Park, Kans.

Keith Kote, Inc., Box 928, Grand Prairie, Tex.

Kenton Meadows Co., Inc., Box 518, Gassaway, W. Va.

L

Logan Diving & Salvage Co., 305 Consolidated Building, Jacksonville, Fla.

M

Mayes Brothers, Inc., Box 2062, Houston.

Clem A. Mayes & Son, Box 764, Lake Charles, La.

Moretrench Corp., 100 Stickle Ave., Rockaway, N. J.

P

Parkhill Truck Co., Box 3807, Tulsa.

Pipe Line Service Corp., Box 318, Franklin Park, Ill.

Pipe Protection Service, Inc., 715 Elizabeth Avenue, Elizabeth, N. J.

Pipecote Service Corp., 3920 S. Peoria, Tulsa.

Pipeline Applications Co., 1801 Arapahoe Street, Golden, Colo.

Pipeline Coating & Engineering Co., Inc., 5501 S. Santa Fe Avenue, Los Angeles.

Pipeline Welding Co., 5100 E. Seventeenth Street, Tulsa.

Pipeline X-Ray Service, Box 6886, Houston.

R

Richardson X-Ray Service, 617 S. Raymond Avenue, Alhambra, Calif.

Road Boring & Tunneling Co., Inc., Box 14214, Houston.

Rocky Mountain Corrosion Service, 4034 S. Billings Boulevard, Billings, Mont.

Gleasons Romans Pipeline Patrol Co., Box 8447, Tulsa.

Rosson-Richards Companies, Box 6886, Houston.

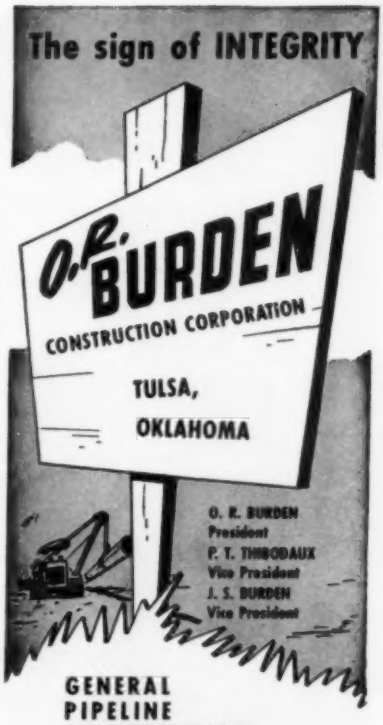
S

E. H. Schmidt & Associates, Inc., 823 S. Detroit, Tulsa.

Secrest Pipe Coating Co., 3315 N. Lewis Avenue, Tulsa.

C. J. "Chas." Simpson Trucking Co., Box 4096, Dallas.

South Plains Ditching Co., 3507 N. Elm, Lubbock, Tex.



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Ed Stitt Trenching Co., 10203 S. Harvard Street, Los Angeles.
Ed Stratton Ditching Service, 453 N. Charles, McPherson, Kans.
Lewis J. Stucker Ditching Service, 1311 Pattie Street, Wichita, Kans.

T

Thayer X-Ray Service, 4048 E. Forty-sixth, Tulsa.
Edgar Tobin Aerial Surveys, 340 Terrell Road, San Antonio.
Tulsa Pipe Coating, Inc., Box 3085, Whittier Station, Tulsa.

W

Wales Trucking Co., Box 6186, Dallas.
Wes-Tex Pipe Coating, Inc., Box 1367, Snyder, Tex.
White Ditching Co., Box 39, Casper, Wyo.
J. O. (Red) Willett, Box 2836, Monroe, La.
Williams Pressure Service Co., Beck Building, Shreveport, La.

X

X-Ray Engineering Co., 858 Burlway Road, Burlingame, Calif.
X-Ray Engineering International, 420 Market Street, San Francisco.

DIRECTORY

Pipeline Engineering Firms

Bechtel Corp., 220 Bush Street, San Francisco.
Commonwealth Associates, Inc., 7 Hayes Street, Jackson, Mich.
Cozart Engineering & Construction Co., Rt. 1, Box 600, Seguin, Tex.
Delta Engineering Corp., Box 13256, Houston.
Dutton-Williams Brothers Ltd., North Canadian Oil Building, Calgary, Alta.
Fish Engineering Corp., M & M Building, Houston.
Ford, Bacon & Davis, Inc., 39 Broadway Street, New York.
Gulf Interstate Engineering Co., 1125 Brazos Street, Houston.
Matthews & Kenan, San Antonio.
Pipe Line Engineering Co., 6612 Harry Hines Boulevard, Dallas.
Pipe Line Technologists, Inc., Box 6957, Houston.
Pipe Line Technologists (Alberta) Ltd., 209 Royalite Building, Calgary, Alta.
Sydney B. Smith, 30 Rockefeller Plaza, New York.
Stearns-Roger Manufacturing Co., 660 Bannock Street, Denver.
Stone & Webster Engineering Corp., 49 Federal Street, Boston.
United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia.
Williams Brothers Co., 326 National Bank of Tulsa Building, Tulsa.
Wood Engineering Co., Box 928, Tyler, Tex.

Note: A Directory of General Pipeline Contractors in the United States, Canada, and abroad appears in the Special Pipeline Section in this issue, pages 119-120.

G. ALLAN MacNAMARA

Portrait by Fabian Bachrach

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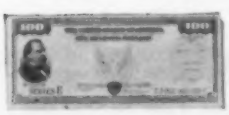

The Oil and Gas Journal
Tulsa, Oklahoma

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Who's Laying Line—and Where

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way.

U.S. Crude-Oil Pipelines

- **Belle Fourche Pipeline Co.**
  Project: 30 miles of 6-in. from Donkey Creek pool to Fiddler Creek pool in northeastern Wyo. Will later build a line from Fiddler Creek to connect with Butte Pipe Line Co. near Osage, Wyo.
  Status: Planned.
- **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.)
  Project: Line from lower Delaware Bay to Philadelphia.
  Status: Planned.
  Completion: 1960.
- **Four Corners Pipe Line Co.** (Shell, Standard of Calif., Continental, Gulf, Richfield, Superior)
  Project: 635 miles of 16-in. from Aneth field in southern Utah to Los Angeles, 86 miles of 12-in. from New Mexico's Bisti field to Red Mesa station 35 miles southeast of Bluff, Utah, and 28 miles of 4, 6, 8-in. feeder lines from other fields in New Mexico and Utah. Will be operated by Shell Pipe Line.
  Status: Under way.
  Contractor: **A. P. Vaughn Construction Co.** has 170 miles of 16-in. from Aneth field to Cameron, Ariz., and 100 miles of 16-in. from Seligman to the Colorado River. **R. H. Fulton & Co** has completed 98 miles of 16-in from Cameron to Seligman, Ariz., and has 217 miles of 16-in from the Colorado River to O'ive, Calif., plus river crossing. **Pacific Pipeline Construction Co.** has 46 miles of 16-in. from Olive to Los Angeles. **Standard Pipeline Construction Co.** has feeder lines.
  Completion: February 1, 1958.
- **Gillette Pipeline, Inc.** and **A. W. Hartwig, Inc.**
  Project: A 102-mile line from Dead Horse Creek field to Casper. Wyo.
  Status: Has applied for permit from Wyoming Pub'ic Service Commission.
- **Great Northern Railway Co.**
  Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and North Dakota, to Clearbrook or St. Paul, Minn.
  Status: Planned.
  Contractor: **Pipe Line Technologists, Inc.** has completed feasibility study.
- **Humble Oil & Refining Co.**
  Project: 90 miles of 16-in. from Hawley to Comyn, Tex.
  Status: Survey and right-of-way work under way.
  Completion: Late 1958.
- **Jayhawk Pipeline Corp.** (Colorado Oil & Gas Corp., National Cooperative Refinery Association)
  Project: 242 miles of 10 and 12-in. from western Meade County, Kansas, to Valley Center near Wichita.
  Status: Will start spring 1958.
  Contractor: **Pipe Line Technologists,** Houston, has engineering contract.
  Completion: August 1958.
- **Offshore Gathering Corp.,** Houston.
  Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)
  Status: Proposed.
- **Oil Field Pipe Line, Inc.**
  Project: 200 miles 8 and 12-in. from near Elkhart, to Ellinwood, Kans.
  Status: Proposed.
- **Shell Oil Co.**
  Project: 17 miles of 3, 4-in. in La. Delta area.
  Status: Under way.
  Contractor: **Brown & Root, Inc.,** W. P. Stanley, supt., office at Buras.
  Completion: March 31, 1958.
- **Shell Pipe Line Corp.**
  Project: 11 miles of 8-in., 3 miles of 10-in., 10 miles of 12-in., 37 miles of 16-in., and 60 miles of 20-in. from Mississippi River Delta area to New Orleans refining area.
  Status: Planned.
  Contractor: **Coates Field Service, Inc.,** has right-of-way acquisition and claims settlement.

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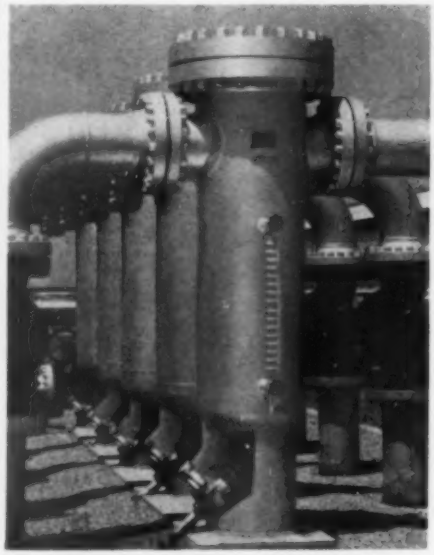

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PIPELINE CONSTRUCTION

Completion: September 1958.

• **Sinclair Pipeline Co.**
Project: 150 miles of 20-in. from Teague, Tex., to Houston.
Status: Under way.
Contractor: **Lone Star Constructors, Inc.** has 143 miles; **Golightly Construction Corp.** has 6 miles.
Completion: June 1958.

• **Southern Kansas Pipeline, Inc.**
Project: 200 miles of 6 to 10-in. in Kans. from southwestern Meade County to 10 miles north of Arkansas City.
Status: Proposed. Request filed with Kansas Corporation Commission for permit.

• **Texas-New Mexico Pipe Line Co.** (Sinclair, Texas Co., Tidewater, Empire)
Project: 512 miles of 16-in. from southeast corner of Utah to Jal, N. M.
Status: Under way.
Contractor: **Four Way Co., Inc.,** has 150 miles from Aneth field southeast. **Panama, Inc.,** has remaining 362 miles.
Comp'etion: May 1958.

• **Toronto Pipeline Co.**
Project: System to connect fields in Cheyenne, Morrill, and Banner counties, Nebr., to Platte Pipe Line Co.'s 20-in. line from Wyoming to Wood River, Ill., and 13 miles of 4-in. plus field lines to Platt's Redding station.
Status: Planned.

U.S. Products Pipelines

• **Alaska-Yukon Refiners & Distributors, Ltd.**
Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Tok Junction, on Canol line, to Anchorage.
Status: Proposed.
Completion: 1959.

• **American Pipe Line Co.**
Project: Line from Gulf Coast to New York City. Has ODM approval to amortize 40 per cent of cost with fast writeoff.
Status: Proposed.

• **Buckeye Pipe Line Co.**
Project: 70 miles of 8-in. from Wayne to vicinity of Durand, Mich.
Status: Under way.
Completion: Early 1958.

• **Cherokee Pipe Line Co.** (Continental Oil Co., Cities Service Oil Co.)
Project: 78 miles of 12-in. from Ponca City to Tulsa, Okla.
Status: To start February 1958.

• **Clark Oil & Refining Co.**
Project: 15 miles of 8-in. from Blue Island, Ill., to Hammond, Ind., area.
Status: Planned.
Completion: Mid-1958.

• **Columbia Gas System, Inc.**
Project: Line from proposed plant near Kenova, W. Va., to proposed plant and storage facilities at Siloam, Ky.
Status: Planned.

• **Conn-Mass Pipe Line, Inc.**
Project: 62 miles of 8-in. and 7 miles of 6-in. from New Haven, Conn., to Springfield, Mass.
Status: Planned.
Completion: April 1958.
Project: 88 miles of 8-in. from Boston to Springfield, Mass.
Status: Proposed.
Project: 133 miles of 16-in. from Linden, N. J., to Hartford, Conn.
Status: Proposed.
Project: 38 miles of 6-in. from Waltham to Fitchburg, Mass.
Status: Proposed.

• **El Paso Natural Gas Co.**
Project: 240 miles of 6-in. from Odessa to El, Paso, Tex.
Status: Under way.
Contractor: **McVean & Barlow, Inc.,** E. J. Miller, supt.
Completion: March 1, 1958.

• **Everglades Pipe Line Co.**
Project: 60 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport and terminals south.
Status: Under way.

• **Katy and New York Central Railroads**
Project: 2,000 miles of 10 or 12-in. from Houston through Kansas City, St. Louis, Indianapolis and Cleveland to Syracuse then down to New York City. A branch would go through Chicago to Detroit.
Status: Planned.
Contractor: **Williams Brothers Co.** has feasibility study.

• **Laurel Pipe Line Co.** (Gulf Refining Co., Sinclair Pipe Line Co., The Texas Co.)
Project: 100 miles of 24-in. and 340 miles of line graduating down to 14-in. at the west terminus, from Philadelphia to Cleveland.
Status: To start early 1958.
Contractor: **Pipe Line Maintenance & Construction Co.,** Camp Hill, Pa., has Susquehanna River crossing.
Completion: Summer 1958.

• **Leonard Refineries, Inc.**
Project: 43 miles of 6-in. from Alma to Lansing, Mich.
Status: Planned.
Contractor: **Welded Construction Co.**
Completion: Spring 1958.

• **Ohio Oil Co.**
Project: 350 miles of 12-in. from Wood River, and Robinson, Ill., to Chicago.
Status: Under way.
Contractor: **Panama-Williams Corp.** has

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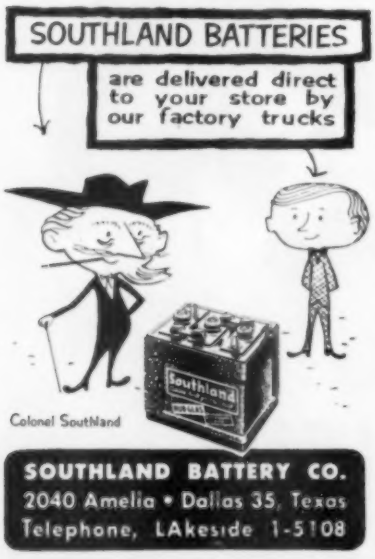
completed 84 miles from Robinson to Champaign.
Completion: 1958.

- **Salt Lake Pipe Line Co.**
  Project: 80 miles of 8-in. loops from Adams to Ontario, Ore.
  Status: Under way.
  Contractor: **Halimac Construction Co.**
- **Shamrock Oil & Gas Corp.**
  Project: Conversion of 120 miles of 6-in. crude line from Sunray, Tex., to Turpin, Okla.
  Status: Under way.
- **Southern Pacific Pipe Lines, Inc.**
  Project: 30 miles of 6-in. and 6 miles of 4-in. from Niland to El Centro, Calif.
  Status: Under way.
  Contractor: **Hood Construction Co.**
  Completion: January 1958.
- **Underground Storage & Exploration, Inc.**
  Project: 393 miles of 12-in. L.P.G. line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.
  Status: Proposed.
- **Union Oil Co. of California**
  Project: 815-mile line from Rifle, Colo., to Los Angeles refining area.
  Status: Proposed.

U.S. Natural-Gas Pipelines

- **American Louisiana Pipe Line Co.**
  Project: 7 miles of 16-in. and 5 miles of 12-in. from Second Bayou to Cameron, La.
  Status: Under way.
  Contractor: **Ford, Bacon & Davis Construction Corp.**
  Completion: December 1958.
- **Arkansas Louisiana Gas Co.**
  Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
  Status: Long-range plans.
- **Carnegie Natural Gas Co.**
  Project: Two parallel lines to provide coke-oven gas to six Pittsburgh area plants: 9 miles of 55-in. and 4 miles of 43-in. each.
  Status: Under way.
  Contractor: **Williams Brothers Co.**
  Completion: January 1, 1959.
- **Chicago District Pipeline Co.**
  Project: 52 miles of 30, 36-in. between Joliet and Chicago, Ill.
  Status: Approved by FPC examiners.
  Completion: 1958.
- **Cities Service Gas Co.**
  Project: 75 miles of 30-in. from Independence to near Welda, Kan.
  Status: Under way.
  Contractor: **R. H. Fulton & Co.**
  Completion: February 1958.
  Project: 6 miles of 30-in. in Montgomery County, Kansas, and 18 miles of 26-in. in Anderson and Franklin counties, Kansas.
  Contractor: **R. H. Fulton & Co.** has the 26-in.
- **Coastal States Gas Producing Co.**
  Project: A 20-mile gathering system from the Rock Island area of Colorado County, Tex., to the United Gas Corp. system.
- **Coastal States Gas Producing Co.** and **Southern Coast Corp.**
  Project: 45 miles of 2 to 10-in. in Bee County, Tex. to connect presently shutin fields with Texas Eastern Transmission Corp.'s system.
  Status: Planned.
- **Coastal Transmission Corp.**
  Project: 562 miles of 12, 20, 22, 24-in. main line and 336 miles of 2 to 14-in. gathering lines between McAllen, Tex., and Baton Rouge, La.
  Status: Survey and right-of-way work under way. Pipe laying to start January or February 1958.
  Completion: January 1, 1959.
- **Colonial Natural Gas Corp.**
  Project: Two systems; one between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.
  Status: Proposed.
- **Colorado Interstate Gas Co.**
  Project: 66 miles of 30-in., 40 miles of 34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pubelo, Colo.; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 24 miles of 22-in. Tex. Panhandle looping.
  Status: Approved by FPC examiners.
- **Consolidated Gas Utilities Corp.**
  Project: 21 miles of 12-in. and 10 miles of 8-in. at Altus, Okla.
  Status: Approved.
- **Eastern Shore Natural Gas Co.**
  Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinental Gas Pipe Line Corp., in Maryland, across entire length of Delaware to Salisbury.
  Status: Approved.
- **El Paso Natural Gas Co.**
  Project: 95 miles of 34-in. San Juan main line loops.
  Status: Under way. Partially certificated.
  Contractor: **R. H. Fulton & Co.** has 28 miles. **Western Pipeline, Inc.,** has 47 miles. Remainder to be let.
  Completion: April 1, 1958.
  Project: 18 miles of 12-in. between Good Field in Borden Co., and the East Vealmoor gasoline plant in Howard Co., Tex.



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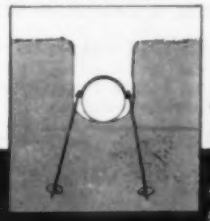
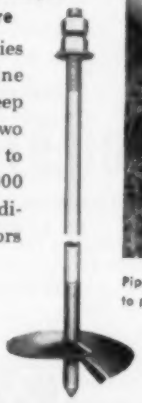
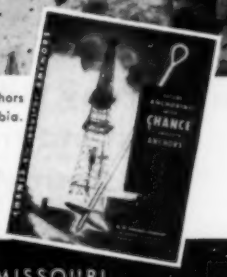


Cut away view of anchors and bracket installed in trench.



Pipeline crew installing Chance Pipeline Anchors to prevent floatation problems in British Columbia.



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PIPELINE CONSTRUCTION

Status: Has temporary FPC approval.

Project: 177 miles of 20-in. from Sonora plant, Sutton County, to Plains plant, Yoakum County, Texas.

Status: Planned. Filed for FPC permit.

Completion: July 1, 1958.

Project: 193 miles of 30-in. Permian-San Juan main line loops.

Status: Planned. Filed for FPC permit.

Completion: September 1, 1958.

Project: 216 miles of 6 to 34-in. and 533 miles of various size in Ariz., Tex., N. M.

Status: Filed for FPC permit.

Project: 38 miles of various size line to make additional gas available at the McElroy-Wilshire plant near Crane, Tex.

Project: 500 miles of 34-in. from Twin Falls, Idaho to California border near Las Vegas, Nev.

Status: Planned.

Completion: September 1, 1959.

• **Equitable Gas Co.**

Project: 12 miles of storage line in Lewis Co., W. Va.

Status: Approved.

• **Gulf Interstate Gas Co.**

Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various size field lines in Acadia and Vermilion parishes, Louisiana.

Status: Approved.

Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish, Louisiana.

Status: Has temporary FPC approval.

Project: 352 miles of 30-in. loop between Louisiana and Leach, Ky.; 54 miles of 24-in. lateral in Louisiana.

Status: Filed with FPC.

Completion: 1959.

• **Houston Texas Gas & Oil Corp.**

Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sales laterals in Florida. Main line to join Coastal Transmission's line from McAllen, Tex., to Baton Rouge.

Status: Under way.

Contractor: **Midwestern Constructors** has the 702 miles of 24-in.; **Harbert Construction Corp.** has remainder.

Completion: June 1958.

• **Humble Oil & Refining Co.**

Project: 250 miles of 26 or 30-in. from Southwest Texas area to Houston, plus 200 miles of various size gathering lines.

• **Iron Ranges Natural Gas Co.**

Project: 120 miles of 6, 12-in. from Mesabi Iron Range to northern Minn.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 63 miles of 12-in. on north shore of Lake Superior.

Status: Pending FPC approval.

Completion: November 1, 1958.

• **Kerr-McGee Oil Industries, Inc.**

Project: 24 miles of 4-in. in Blocks 21, 22, and 32 to connect wells with its Breton Sound production island off the Louisiana coast.

• **Manufacturers Light & Heat Co.**

Project: 3 miles of 12-in. from Wellsville to a point in Saline Township, Ohio; 8 miles of 12-in. in Brook County, W. Va.; 4 miles of 10-in. in Ohio County, W. Va.

Status: Approved.

• **Michigan Consolidated Gas Co.**

Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.

Status: Under way.

Contractor: **Somerville Construction Co.**; Floyd Huduall, supt., office at Cadillac.

Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.

Status: Under way.

Contractor: **Somerville Construction Co.**, jointly with **H. L. Gentry Construction**, Frank Morris, superintendent, office at Hart, Mich.

• **Michigan Gas Storage Co.**

Project: 40 miles of 12-in. and 12 miles of gathering lines from Overisal field in Allegan County to Kalamazoo, Mich.

Status: Planned.

Contractor: **Bechtel Corp.**

• **Michigan Wisconsin Pipe Line Co.**

Project: 33 miles of 4, 6-in., 2 miles of 12-in., 4 miles of 10-in., and 7 miles of 8-in. gathering lines in LaVerne Field, Harper County, Okla.

Status: Planned. Pending FPC approval.

Completion: October 1, 1958.

Project: 56 miles of 20-in. extension of LaVerne line, Harper County, Okla.

Status: Planned. Pending FPC approval.

Completion: October 1, 1958.

Project: 25 miles of 12-in. and 21 miles of 24-in. loops in Wis. and Mich.

Status: Planned. Pending FPC approval.

Completion: October 1, 1958.

• **Midwestern Gas Transmission Co.**

Project: Line from Portland, Tenn., to Minnesota-Canada border near Emerson, Man.: 670 miles of 24-in., 218 miles of 20-in, 371 miles of 16-in., 115 miles of 12-in., 70 miles of 10-in., 179 miles of 8-in., 147 miles of 6-in., 174 miles of 4-in., 106 miles of 3-in.

Status: Pending FPC approval.

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MODEL HP US Patent #2629002 (electrode)

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The model HP self-contained line-traveling detector, has its own power supply (wet cell battery); needs no ground wire and operates equally well on damp or dry pipe. Adaptable on any size transmission pipelines.

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Tinker and Rasor shoulder-pack holiday detector is designed to give the best possible inspection. It offers an adjustable voltage output range from 5,000 to 20,000 volts of sharp pulse type voltage which puts less stress on protective coatings. This equipment is available with conductive silicone brush type electrodes (non-fouling in soft coatings), for inspecting flat or irregular surfaces and with full and a half circle spring electrodes. This model will inspect damp or dry coating equally well and, as in all Tinker and Rasor detectors, has audible bell signal.

MODEL EP

MODEL M 1

PAINT AND THIN FILM

Tinker and Rasor Model M 1 detector is used for inspection of thin films where complete protection is a necessity. The detector has a bell alarm signal and is equipped with a leather case and belt loop. The potential of inspection is 67 volts. Not a spark detector, it operates with a damp cellulose sponge mounted on a phenolic wand handle. Pin holes can be pin pointed by using a corner of the sponge once a holiday has been detected.

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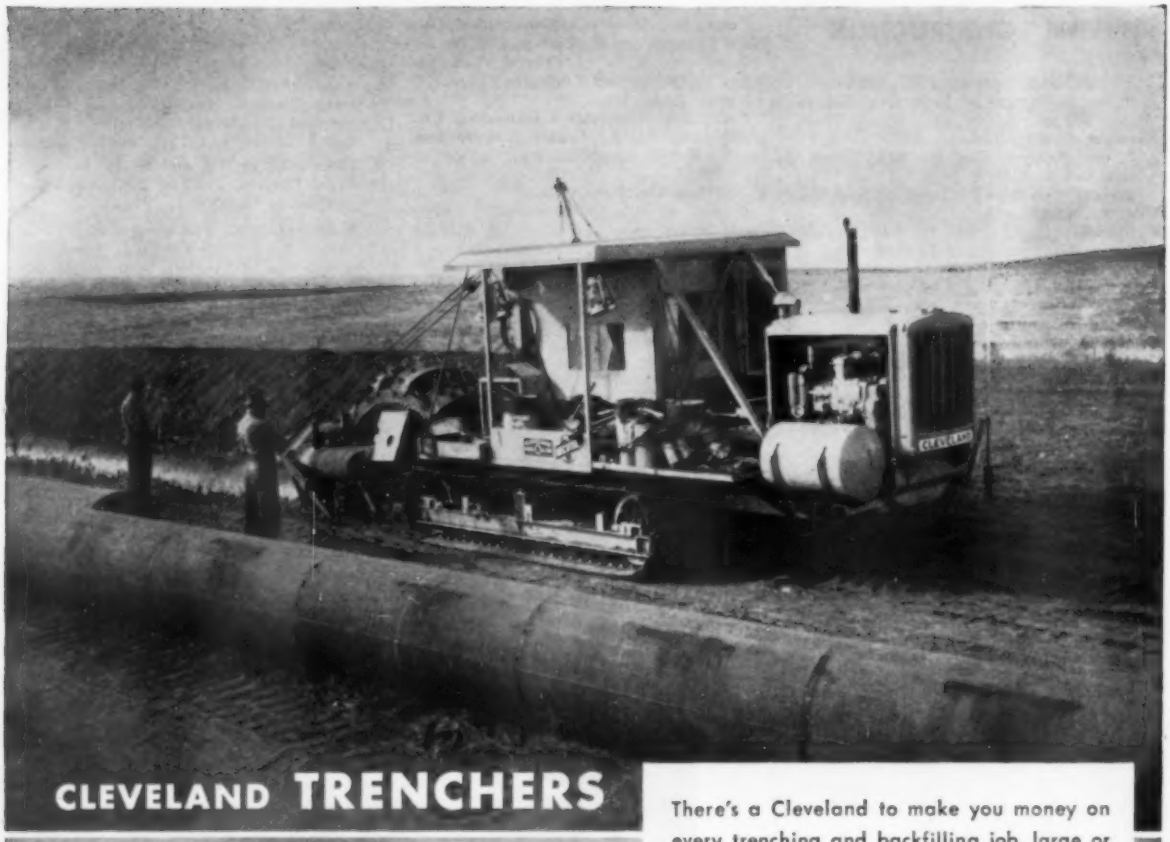

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PIPELINE CONSTRUCTION

• **Mookl Chemical & Gas Corp. and Missouri Transmission Corp.**
Project: 425 miles of 16-in. from Pottawatomie County, Okla., to St. Louis. Mookl, 1341 S. Boston, Tulsa, will build Okla. section. Missouri Transmission, Springfield, Mo., will build the Mo. section.
Status: Initial FPC filing rejected. Will refile.
Contractor: **Fish Engineering Corp.**

• **Natural Gas Pipeline Co. of America**
Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and 91 miles of 30-in. loops along parts of its main line.
Status: Approved by FPC examiner.
Project: 337 miles of 30-in. between Fritch, Tex., and Beatrice, Neb., and 59 miles of 36-in. between Beatrice and Joilet, Ill., along existing system.
Status: Pending FPC approval.
Completion: 1959.

• **North Carolina Natural Gas Corp.**
Project: 630 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.
Status: Under way.
Completion: Spring 1958.

• **Northern Natural Gas Co.**
Project: 23 miles of 24-in. loops in Nebr. and Iowa; 43 miles of 30-in. loops in Kans., Nebr., and Iowa; 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.; 44 miles of 16-in. in Duluth-Superior-Iron Ranges area.
Status: Pending FPC approval.
Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.
Status: Proposed.
Project: 1,090 miles of 2 to 16-in. branch lines to serve communities in Minn., Iowa, S. D., Nebr., Wis.
Status: Filed with FPC March 18, 1957.
Project: 28 miles of 30-in. loop in Tex. and Kans.
Status: Pending FPC approval.

• **Northern Utilities Co.**
Project: 35 miles of 16-in. in Fremont-Natrona County, Wyoming, area; 8 miles of 12-in. around Casper; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander area.
Status: Planned.

• **Offshore Gathering Corp.**
Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)
Status: Application pending with FPC.

• **Olin Gas Transmission Corp.**
Project: Mississippi River 3 and 8-in. crossing near White Castle, La.
Status: Under way.
Contractor: **Houston Contracting Co.**, A. J. Slovack and R. E. Thornton, supts., office at White Castle.

• **Pacific Gas & Electric Co.**
Project: 138 miles of 34-in. looping of the Topock-Milpitas line.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**
Completion: February 1958.
Project: 5 miles of 16-in., 160 miles of 12-in., 8 miles of 8-in. from Corning to Eureka, Calif.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.** and **Alex Robertson Co.**
Completion: June 1958.
Project: 13 miles of 12-in. and 2 miles of 10-in. from Santa Cruz to Davenport, Calif.
Status: Under way.
Contractor: Company personnel will build part; remainder to be let.
Completion: January 1958.

• **Pacific Lighting Gas Supply Co.**
Project: 83 miles of 34-in. from North Coles Levee to Newhall, Calif.
Status: To start early 1958.
Contractor: **Engineers Limited Pipeline Co.**
Completion: July 1, 1958.

• **Pacific Northwest Pipeline Corp.**
Project: 40-mile line from Ute Trail gas fields in northeastern Utah to its main line in western Colorado.
Status: Planned to start spring 1958.

• **Pennsylvania Gas Co.**
Project: 23 miles of 10-in. in Erie County, Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa., 30 miles of branch lines, several small distribution lines.
Status: Has FPC permit.

• **Permian Basin Pipeline Co.**
Project: 29 miles of 10-in. gathering lines from Crane and Pecos counties to McCamey, Tex.
Status: Under way.
Contractor: **Lone Star Constructors, Inc.**

• **Piedmont Gas Co.**
Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Caro'ina to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.
Status: Has FPC approval.

• **Seaboard Oil Co.**
Project: 6 miles of 10-in. in Vermilion and Lafayette parishes.
Status: Has FPC examiner's approval.

• **Shell Oil Co.**

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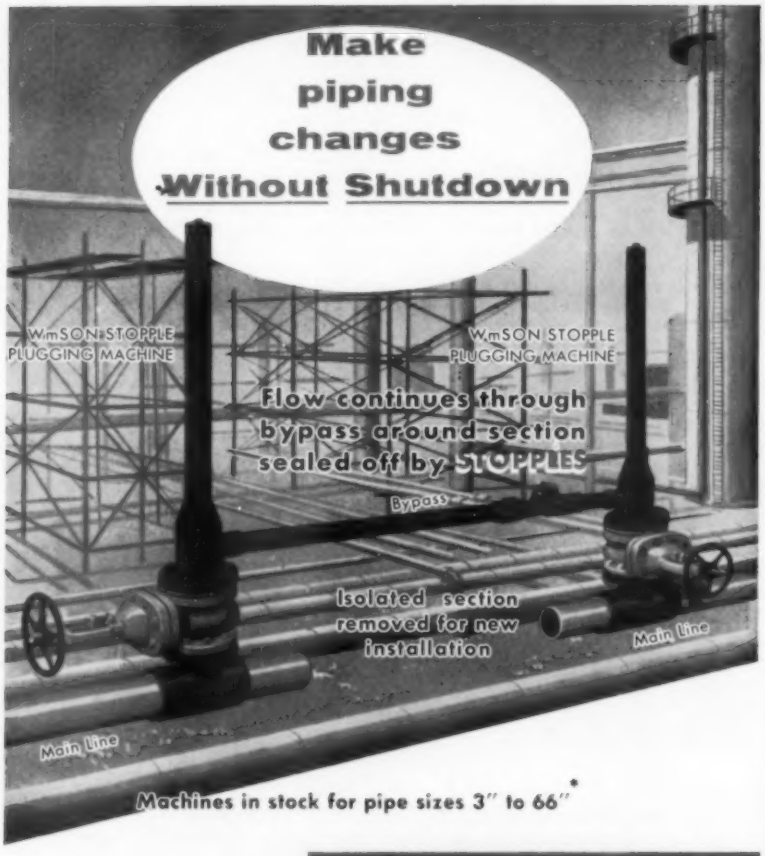
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PIPELINE CONSTRUCTION

Project: 9 miles of 6-in. from Lake Pontchartrain to Norco, La.
Status: Planned.

• **Southern Natural Gas Co.**
Project: 335 miles of 4 to 26-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.
Project: 45 miles of 6 to 10-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.
Project: 25 miles of 6 to 20-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.

• **Tennessee Gas Transmission Co.**
Project: 556 miles of 30-in. from Mississippi Delta area south of New Orleans to Portland, Tenn.
Status: Has temporary FPC approval.
Project: 76 miles of 24-in. from Coudersport, Pa., to Hamburg, N. Y.
Status: Has temporary FPC approval.
Project: 163 miles of 30-in. and 101 miles of 26-in. from Portland, Tenn., to near Lancaster, Ky.; from Winchester, Ky., to Morehead, Ky.; from Catlettsburg, Ky., toward Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from Morehead, Ky., to Catlettsburg, Ky.
Status: Has Temporary FPC approval.
Project: 10 miles of 12-in. extension of system in Gulf of Mexico to terminate at CATC Group's Block 59 field.
Status: Under study.

• **Texas Eastern Transmission Corp.**
Project: 17 miles of 8-in. and 3 miles of 6-in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.
Status: Has FPC approval.
Project: 140 miles of 30-in. between Kosciusko, Miss., and Uniontown, Pa., 105 miles of 30-in. between Opelousas, La., and Kosciusko, 22 miles of 14-in. supply line in La.
Status: Pending FPC approval.

• **Transcontinental Gas Pipe Line Corp.**
Project: 202 miles of 36-in. and 132 miles of 30-in. main line loop; 164 miles of 24-in. to connect storage in Pa.; 202 miles of 10 to 20-in. gathering lines in southeast La.; 48 miles of 10 to 20-in. to tap gas off Tex.
Status: Pending FPC approval. Planned to start February 1, 1958.
Project: 57 miles of 36-in. main line loop.
Status: Pending FPC approval. Planned for 1959.
Project: 57 miles of 30, 36-in. loops in La., Miss., Ala., Ga., S. C., and 247 miles of mostly 24 and 16-in. laterals in Tex., and La.
Status: Under way.
Contractor: **H. B. Zachry Co.** and **Panama-Williams Corp.** have gathering lines.
Completion: January 1958.
Project: 87 miles of 24-in. laterals, plus small gathering lines connecting seven Louisiana fields with the New Orleans area.
Status: Pending FPC approval.

• **Trans-Western Pipe Line Co.** (Warren Petroleum, Monterey Oil Co.; J. R. Butler).
Project: A line from Four Corners area to Calif. border.
Status: Proposed.

• **United Gas Pipe Line Co.**
Project: 18 miles of 12-in. from Lirette-Mobile line in Jackson County, south to Bayou Casottee industrial area east of Pascagoula, Miss.
Status: Approved.
Project: 202 miles of 30-in. loop from southeast Louisiana, to Mobile, Ala.
Status: Pending FPC approval.

Canadian Crude-Oil Pipelines

- **Act Oils, Ltd.**
  Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Bella Coola, B. C.
  Status: Request has been made for permit from the B. C. government.
- **B-A Alberta Pipe Line, Ltd.**
  Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.
  Status: Pending approval.
- **Bituminous Oil Pipeline Co.** (Royalite Oil Co. and Can-Amera Oilsands Development, Ltd.)
  Project: 250-mile line from Athabasca oil sands in northeastern Alta., to Edmonton.
  Status: Long-range plans.
  Completion: 1960.
- **East Coast Transmission Co.** (Pacific Petroleums, Ltd., Home Oil, Ltd., Canadian Homestead Oil, Ltd., Merrill Petroleums, Ltd.)
  Project: Line from Alberta to Montreal.
  Status: Proposed.
- **Gibson Petroleum Co., Ltd.**
  Project: 25 miles of line from Willesden Green field to near Rimbley, Alta.
  Status: Has Alberta Government approval.
- **Westcoast Transmission Co., Ltd.**
  Project: Line to parallel its 650-mile, 30-in. gas line from Peace River to Vancouver, B. C.
  Status: Under study.
- **Interprovincial Pipe Line Co.**
  Project: 82 miles of 24-in. loops in Alta. and Sask.
  Status: Planned.
- **Westspur Pipe Line Co.**
  Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff-Glen Ewen area to tap Cantal, Hastings, Florence, Carnduff, and Glen-Ewen fields; 34 miles of 4, 6, 8-in. gathering lines.
  Status: Has requested permit from Board of Transport Commissioners.
  Contractor: **Majestic Contractors, Ltd.**, Jeff Minter, supt., office in Estevan, Sask.
  Completion: No date set.

Canadian Products Pipelines

- **Hydrocarbons Pipeline Co.**
  Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.
  Status: Has permit from Parliament of Canada. Seeking approval by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.
  Construction consultants: **Dutton-Williams Brothers, Ltd.**, and **A. D. Little Co.**

Canadian Natural-Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.**
  Project: 637 miles of 34 to 16-in. gathering lines in Alberta.
  Status: Under way.
  Contractor: **Dutton - Williams Brothers, Ltd.**, has preliminary studies, design and management - engineering. **Universal Pipe Line, Ltd.**, subsidiary of Mannix, Ltd., jointly with **Marine Pipeline & Dredging Co.**, has crossing of Red Deer River near Cavendish, Alta., J. Hysuick, spread superintendent, office at Empress. **Fulton Banister, Ltd.**, has completed 17 miles of 34-in. west from Burstall, Sask., to near Cavendish, Alta., and 100 miles of 18-in. north to Bindless and Provost fields.
- **Alberta & Southern Transmission Co., Ltd.**
  Project: 1,300 miles of 36-in. from Alberta to San Francisco area plus 47 miles of gathering lines.
  Status: Planned.
  Completion: 1960.
- **Northern Ontario Pipe Line Crown Corp.**
  Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy.) 360 miles from Port Arthur to Kapuskasing remains to be laid in 1958.
  Status: Under way.
  Contractor: **Nelen, Ltd.; Majestic Contractors, Ltd.; River Construction Corp.; Mannix, Ltd.; and Morrison Shivers, Ltd.**
  Completion: November 1958.
- **Northwestern Utilities, Ltd.**
  Project: 72 miles of 16-in. from Pembina field to Edmonton, Alta.
  Status: Approved. Planned for 1958.
  Completion: 1958.
- **Trans-Canada Pipe Lines, Ltd.**
  Project: 491 miles of 30-in. from Kapuskasing to Toronto.
  Completion: October 1, 1958.
- **Westcoast Transmission Co., Ltd.**
  Project: 42 miles of 20-in. and 100 miles of 30 in. from Savanna Creek area, Alta., to Canadian-Idaho border.
  Status: Planned.
  Completion: November 1, 1958.
  Project: Looping of present system to double capacity.
  Status: Planned.

Foreign pipeline construction is omitted from this issue. It will appear next in the February 3 issue.

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Improved internal construction of the Detectron pipe detector has not only resulted in easier and more accurate use of the instrument but also reduced greatly the possibility of cutting unknown pipes with bulldozers and ditching machines, the maker reports. It is now much easier to determine the exact number of pipes which lie in the path of excavating machinery.

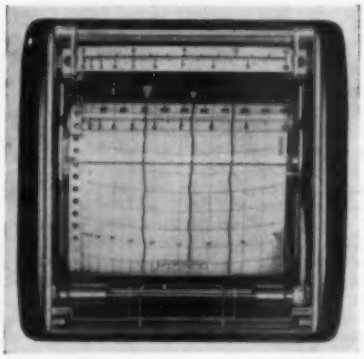
The new design produces a more stable field signal. This makes it possible to tune the instrument more sharply, providing improved sensitivity, and allowing easier "separation" of pipes which run close together. Thus, two closely parallel pipes, which formerly showed as one pipe, can now be detected independently. **Write or call: Computer Measurements Corp., 5528 Vineland Avenue, Dept. 99, North Hollywood, Calif., for details on redesigned pipe detector.**

•

Control Instruments Have Added Features

A total of six new features have been added to the Foxboro standard panel type of Consotrol instruments, the maker reports. Two of these advances permit greater recorder flexibility.

First, the Model 53 and Model 54 (pullout) instruments will accommodate three pens. Thus three measurements can be monitored on the same chart. Second, the Model 54 recording control station can be tilt-mounted for use in console units.



Two automatic-control developments extend the number of control actions available with the Model 58 controller. In addition to proportional, reset, and derivative, it is now possible to achieve batch Stabilog and Auto-Selector actions.

Batch-Stabilog control permits the use of reset action on batch processes without "wind up" or "overshooting" at the start of an operating cycle. The patented Auto-Selector action provides a smooth transfer of reset control selectively for any number of related variables. **Write or call: Foxboro Co., Foxboro, Mass., for details on new features of Consotrol instruments.**

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

.....

Described in OIL AND GAS **JOURNAL** - Issue of **January 20, 1958**

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

DATE.....

SHOWCASE . . .

New Equipment

Chromatograph Readout Gives Signal Peaks

The SIE chromatograph readout provides instantaneous, integrated, digital readout of the signal peaks produced by chromatographs currently used in the process industry. It

can, therefore, e'iminate the time-consuming measurement of peak areas by planimetry, the maker reports. The unit accepts an input signal directly from the sensing bridge in a chromatograph.

The signal is amplified, accurately integrated, and then displayed on an impulse counter with an e'ectrical zero reset. Two counters are provided—one for individual peak count and the other for accumulated count.

Accuracy of the entire readout is equal to that of present hand-integration methods. Output terminals for a recorder are provided. Transistor circuitry is used instead of vacuum tubes or relays to provide higher reliability. **Write or call: Southwestern Industrial Electronics Co., P. O. Box 13058, Houston 19, for details on chromatograph readout.**

●

Header Tank Prevents Radiator Leaks

Called the expansion header tank, it is made in two telescoping sections. Fluid is sealed by a Neoprene O-ring embedded in the male member. It is also available on a complete core section.

The device permits visual inspection and cleaning of cores in the field. And it promises to reduce core inventories, the maker says. An expansion-joint principle is used to permit longitudinal misalignment in excess of 10°. This prevents damage from torque or tension. The header tank can be cleaned on the rig floor. **Write or call: Kool-Master Engineering Co., P. O. Box 1643, Odessa, Tex., for details on header tank.**

Valve Automatically Switches Tanks

Unaffected by temperature, the selector valve automatically switches the flow of liquids under pressure from one tank to another or from a series of tanks to processing. It can be inserted in lines where tanks are equipped with individual pumps. The valve will direct the flow of liquid from one or all tanks at the same time. It will seal off an empty tank when operating from all tanks.

When feeding from one tank at a time, the valve frees an operator from watching gages and tanks as critical low points are reached. He can throw a full tank in any time before this point is reached. Both tanks will then feed liquid until the first tank runs dry. At that time, the second tank takes over. Such a setup can include any number of tanks.

Involving only three parts, the valve is fast acting and positive. It causes no pressure drop or flow restriction, the maker claims. Providing a pressure range up to 100 psi., the valve is easy to install. Any gas can be handled, as well as any fluid that can be pumped. **Write or call: New Products Corp., Skokie, Ill., for details on selector valve.**

33 WEST TEXAS OIL WELLS PROTECTED FROM EXTERNAL CASING CORROSION BY CSI

Two casing leaks in West Texas oil wells cost this company more than $25,000 each. External corrosion proved to be the cause.

The company then decided to protect 33 of its other West Texas wells cathodically. CSI was awarded the job on a competitive bid basis.

CSI engineers—pioneers in well protection work—furnished all the engineering, labor, materials and equipment needed. Rectifiers were used as the applied current source. The job was done in 10 consecutive days for about $330 per well.

You'll find it pays to call CSI for engineering, installation services or quality cathodic protection supplies. Call or write today—quotations or estimates without obligation.

CSI

CORROSION SERVICES INCORPORATED
Tulsa, Oklahoma

P. O. Box 7343, Dept. J-2 Telephone: Circle 5-1351

From New York . . . From Houston
From Miami . . .

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KLM also offers fast, expert cargo service across the Atlantic to all the world. For your personal transportation *and* for personalized air cargo service . . . Choose KLM . . . You'll agree . . .

It's a Treat to go Dutch

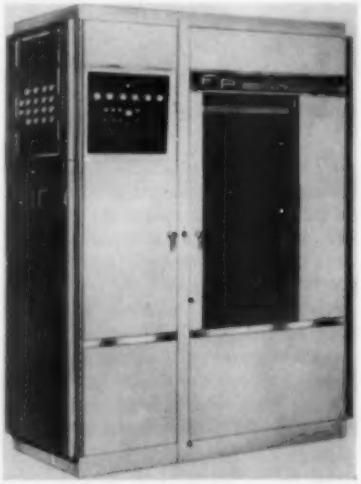
SEE YOUR TRAVEL AGENT
or nearest KLM office.

KLM
ROYAL DUTCH AIRLINES

Data Logger Easily Modified

Besides the use of building-block construction, the Series 1200 data logger feature flexible pinboard programing. Standard plug-in subassemblies make modification or expansion of the logger easy, the maker says.

The logger can handle from 200 to 2,000 input variables, depending on the scanning method used. It makes conversions to d.c. voltages; performs zero offset, scaling, and characterization of nonlinear inputs, and records all readings on an automatic typewriter in digital form.



Readings can be recorded simultaneously on a punched tape which can be used with an analog computer for closed-system control of the process variables. **Write or call: Fischer & Porter Co., 464 Jacksonville Road, Hatboro, Pa., for details on Series 1200 data logger.**

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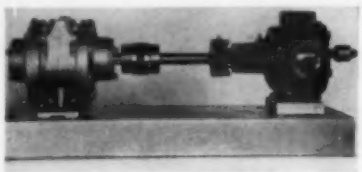


Gas-Powered Motor Drives Transfer Pump

An unusual method of using gas pressure to power circulating and transfer pumps and lube-oil pumps on gas engines is offered by this gas motor. Power is obtained from gas under pressure as it expands.

The gas motor is a rotary design. A rotor and sliding vanes are the only moving parts. Gas pressure and centrifugal force hold the vanes lightly

New Equipment

against the housing for an efficient and uniform seal. They eliminate the use of springs and counterweights to obtain a starting torque.

The power developed is continuous and pulseless. The vanes take up their own wear automatically. The shaft turns in permanently lubricated, sealed ball bearings. The shaft seal requires no packing or adjustment.

The gas motor is available in two sizes. Model 8F develops a maximum of 4 hp. at 100 psig. gas pressure, and Model 16F develops a maximum of 7½ hp. at 100 psig. gas pressure. Maximum working pressure of the gas motor is 100 psig. **Write or call: Hy-Bon Engineering Co., Inc., 2121 West Florida Avenue, Midland, Tex., for details on gas motor.**

●

Shaft Seal Shuts Out Corrosives

Positive sealing in the presence of and in contact with active solvents and corrosives can be achieved with this new Chempac Teflon clipper seal, the maker reports. The seal can successfully contain oils with varying aniline points that are destructive to many compounds.

The Teflon body of the seal can not only be encased in stainless steel but in other corrosion-resistant alloys. The seal lip is actuated by a stainless-steel spring. The unit is assembled so all components are concentric.

An effective seal is formed initially by the interference fit of the seal lip. After the seal is in service, wear progresses to a point of equilibrium where it practically ceases. The seal continues to serve effectively.

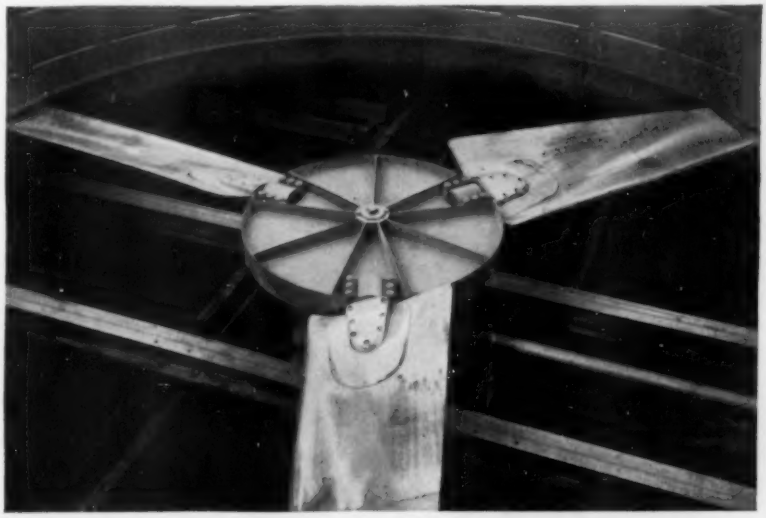
Recommended shaft finishes for use with the seal range from 4 to 8 micro-inches. **Write or call: Dept. PK 124A, Johns-Manville Corp., 22 East Fortieth Street, New York 16, for Chempac packings and gaskets brochure.**

●

New Plane Cruises At 158 M.P.H.

The new Cessna Skylane model is equipped with a full instrument panel and sells for a package price. It has a three-color exterior-paint combination and is entirely painted.

Equipped with special glass-fiber speed fairings, the plane provides a choice of Lear or Narco omni-transceiver with crystals and low-frequency range, direction and horizontal gyros, sensitive altimeter, clock, outside air-temperature gage, rate-of-climb indicator, and turn-and-bank indicator. Other standard equipment



HOW TO CUT COOLING TOWER MAINTENANCE COSTS

Hartzite plastic fan blades practically eliminate fan blade replacement problems in cooling towers and heat exchangers. They effectively resist corrosion, abrasion and vibration. Hartzite blades are constructed stronger to last longer. These tough, rugged blades are made of a phenolic-impregnated fabric-base material — solid construction . . . won't scale, won't peel . . . means low maintenance.

The hub section is dynamically balanced . . . solidly constructed of welded steel . . . with gussets for extra strength and increased safety.

Hartzite plastic fans are available in sizes from 10′ to 22′. Hubs are designed for 2, 3, 4 or 6 blade assemblies.

Find out more about how Hartzell helps you to cut cooling tower maintenance costs. Mail the coupon below for new bulletin A111B, "Cooling Tower and Heat Exchanger Fans".

HARTZELL PROPELLER FAN CO.
Division of Castle Hills Corp.

Please send me a copy of Bulletin A-111B. **72 THOMAS BLVD., PIQUA, OHIO**

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

includes speed fairings on both the main gear and the nose wheel, tinted glass in all windows, sun visors, navigational-light flasher, and a tow bar modified for use with speed fairings.

A six-cylinder 230-hp. Continental O-470-L engine powers the plane. **Write or call: Cessna Aircraft Co., Wichita, Kan., for details on Skylane.**

●

New Material Outlasts Steel

Castable in many shapes, the new wear-resistant, self-lubricating material outwears steel 60 to 1, yet it can be cast without heat or pressure, the maker reports. Because of its high resistance to most acids, alkalies, solvents, and other chemicals, it can be valuable for lining tanks and repairing chemical equipment.

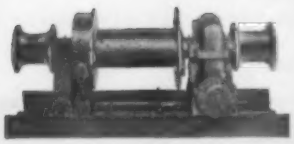
Called Devcon WR, it is supplied in paste form. Upon the addition of a hardening agent, it becomes a syrupy liquid which can be cast or poured into a variety of shapes. Two hours after the addition of the hardening agent, the material is said to become so tough and rigid it cannot be machined expect with carbide or

similar tools. No heat or pressure is required for hardening. **Write or call: Devcon Corp., Danvers, Mass., for details on Devcon WR.**

●

PLENTY OF
PULL
POWER
PLUS PERFORMANCE

That's the guarantee you get when you put a Tulsa Winch to work . . . because Tulsa Winches are precision-made from highest quality materials, then tested to withstand pulls TWICE their rated capacities. They are designed for smoothest operation under the most rugged conditions . . . in a wide range of models and sizes. Also a complete line of power take-offs.



TULSA WINCHES

Tulsa Winch
TULSA OKLAHOMA
DIVISION OF VICKERS INC.

New Gas-Lift Valve Is Retrievable

Employing only two moving parts, the Type F valve has no metal moving parts. It can be used for either continuous or intermittent flow by making simple changes at the wellhead.

The two moving parts are a main valve and a reverse check valve. Both are of a resilient, Hycar composition which effects a bubbletight seal, even with sand-laden fluids, the maker claims. Acidizing, fracturing, and other remedial operations do not affect valve operation. The composition elements are said to resist erosion better than metal.

Large valve ports assure ample gas to lift a given fluid load at optimum efficiency. Tubing pressure has no effect on valve operation. Opening pressure of the valve can be positively calculated because the valve is sensitive to casing pressure only.

With the valve, an operator has complete control of gas injected at the surface on either continuous or intermittent lift. Run with an ordinary kick-over tool, the valve lands in a side-pocket mandrel. **Write or call: Otis Engineering Corp., P. O. Box 35206, Dallas, for details on Type F gas-lift valve.**

SHOWCASE . . .

New Literature

Positive-Displacement Rotary Pump with controlled floating vanes is described in a new bulletin. The pump can be used for vacuum pumping, pressure and vacuum pumping at the same time in the same unit, and with air or hydraulic motors. The high temperature rise due to friction, usually found in some vane type of pumps, is said to be eliminated in the pump. All parts where pumping action takes place rotate in the direction of the flow. Radial and lateral control floats the vane ends in the working chambers, preventing them from touching either the sides or race as they revolve. **Write or call: Rengineering Products Co., 540 North Avenue, Libertyville, Ill., for Circon Pump bulletin.**

●

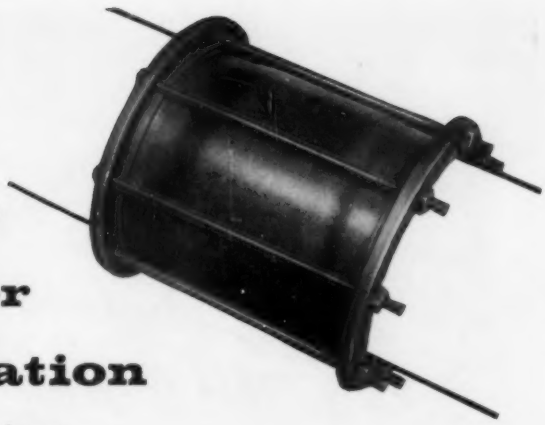
Electrified Oil-Well Drilling Equipment Bulletin 3480 tells how GE differential generators eliminate the need for current and voltage-regulating controls and other apparatus used with some electric drives. The drive is available in many sizes for offshore rigs, skid and trailer-mounted land rigs, and for shallow and deep well drilling. The drive features an air-throttle system and shunt motors. The drive systems are made up of a GE-752H drilling motor, drilling generators, exciter sets, control equipment, and cable. **Write or call: General Electric Co., Schenectady 5, N. Y., for Bulletin GED-3480.**

●

Seamless-Steel Welding Fittings and forged-steel flanges are described in new 32-page Catalog A-100. Reviewed in the booklet are 45° and 90° elbows, 180° returns, straight tees, reducing-outlet tees, caps, concentric and eccentric reducers, lap-joint stub ends, and welding-neck and slip-on flanges. Charts give detailed specifications of each fitting. **Write or call: Clyde Tube Forgings of America, Inc., Foot of S. W. Gibbs, Portland 1, Ore., for Catalog A-100.**

●

New Bronze Goods Catalog covers service and curb stops, fittings, and valves. The products are fully illustrated and described, and are designed for use by petroleum and natural-gas industries and for pipeline contractors. All of the bronze goods shown are guaranteed to meet AWWA specifications. The catalog also contains



for faster installation join pipe

THE DRESSER WAY!

You'll find plenty of uses for Dresser Couplings and Long Sleeves around a drilling rig . . . or anywhere else you join pipe.

That's because Dresser Long Sleeves make pipe joining so quick and easy. Pipe threading is eliminated. You simply slip on the sleeve and tighten with a wrench. Perfect alignment of pipe sections is unnecessary because the specially compounded rubber gasket permits up to 4° deflection at joints.

You get a permanent, bottle-tight connection every time—one that has the "give and take" necessary to absorb vibration, settlement and other stresses.

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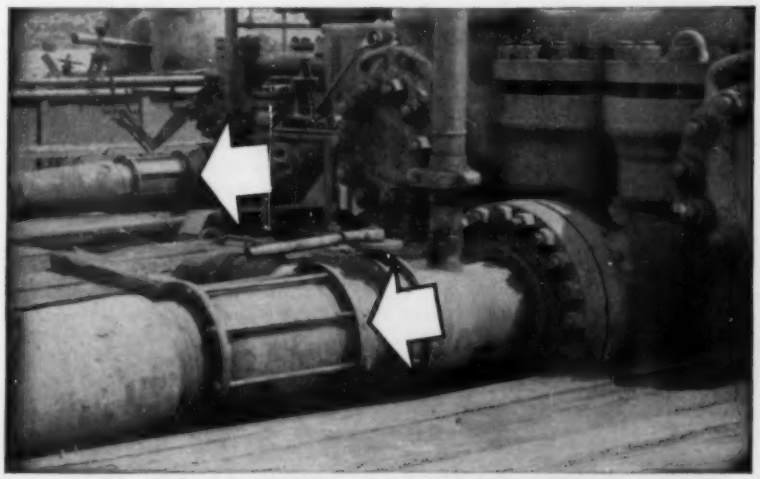

AVAILABLE AT ALL LEADING OILFIELD SUPPLY STORES IN THE UNITED STATES AND CANADA

Style 38 Coupling

Style 40 Long Sleeve

Hydropak® Asbestos Cement Pipe Clamp

Style 63 Expansion Joint

Style 39 Insulating Coupling

Joe:
Mud pump is leaking fluid because packing rolls and rides the rod. Do you know of a packing which won't do this? Bill
BILL!
R/M VEE-SQUARE PACKING PROVIDES THE SOLUTION. SQUARE SHOULDERS PREVENT ROLLING.
JOE
RUBBER CUSHIONS

A triumph of packing ingenuity, patented R/M Vee-Square Packings are designed to come through the roughest treatment with flying colors. They are nonyielding, they require no sensitive gland adjustments, and they can take normal gland pressure. Soft rubber cushion between rings helps prevent blow-by, and they seal automatically.

For reciprocating pumps, oil field mud pumps, high-pressure lubricators, steam hammers and special hydraulic equipment, the solution to your packing problem and your best way of keeping new rods new longer, is R/M Vee-Square Packings.

Call on the vast packing experience of R/M engineers for help in meeting the most exacting requirements of the petroleum industry.

R/M MAKES A COMPLETE LINE OF MECHANICAL PACKINGS—including Vee-Flex,* Vee-Square, Universal Plastic, and "versi-pak"*; GASKET MATERIALS; TEFLON* PRODUCTS. SEE YOUR R/M DISTRIBUTOR.

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MECHANICAL PACKINGS AND GASKET MATERIALS

RAYBESTOS-MANHATTAN, INC., Mechanical Packings • Asbestos Textiles • Industrial Rubber • Engineered Plastics
Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings
Brake Blocks • Clutch Facings • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

a convenient comparison chart which lists, opposite the Pubco Bronze stock numbers, the stock numbers of other manufacturers making similar products. **Write or call: Pubco Bronze, 1447 Naud Street, Los Angeles 12, for Pubco Bronze catalog.**

●

Refractories for Every Petroleum-Processing Need are the subject of a new four-page bulletin. Included in the full-color brochure are data on eight types of castable refractories for service to 3,000° F., and fireclay and high-alumina refractory brick. Also reviewed are insulating refractories, a series of seven bonding mortars and clays, tower packings, and acidproof brick and tile. **Write or call: Harbison-Walker Refractories Co., Farmers Bank Building, Pittsburgh 22, for refractories bulletin.**

●

Double-Enveloping Worm Gears are presented in new Bulletin CD-200. The brochure lists extensive technical information on the design and application of cone drive gears. The 24-page, 2-color brochure also contains detailed engineering formulae and step-by-step instructions for using them in designing and applying cone-drive gearing to drives of all types. Included also are service factors and lubrication information. **Write or call: Cone-Drive Gears Div., Michigan Tool Co., 7171 East McNickhols Road, Detroit 12, for Bulletin CD-200.**

●

Magnetic Oxygen System for Flue-Gas Analysis is discussed in new four-page Application Data Sheet 463-60. Because excess air oxygen is measured directly and sample averaging is representative of actual combustion, this system provides a reliable index of combustion conditions—even with multifuel firing, the maker says. A full-page display of a recently installed oxygen system shows the functional relationship of the reverse jet-probe and steam-sampler units, regular and auxiliary sample-averaging units, magnetic oxygen analyzers and recorders, and a test oxygen assembly as used in a new 220,000-kw. twin-furnace boiler. **Write or call: Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia 44, for Application Data Sheet 463-60.**

●

Supplies and Accessories for Gas and Arc Welding are presented in new 48-page Catalog ADC 848B. Listed in this catalog—which contains over

100 illustrations—is complete information on ferrous and nonferrous welding rods for oxyacetylene welding and Heliwelding. Also discussed are welding and brazing fluxes and their applications, aluminum welding fluxes, and silver and other brazing alloys. Reviewed too is protective equipment, including goggles, glare-protection spectacles, cap-and-goggle combinations, welding helmets, and face shields. **Write or call: Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 150 East Forty-second Street, New York 17, for Catalog ADC 848B.**

•

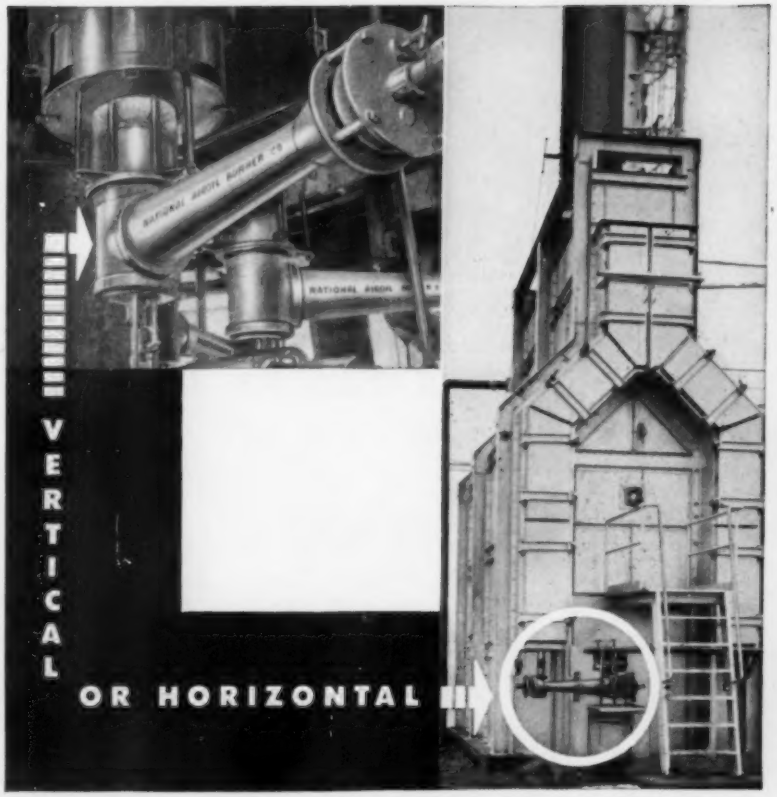
Semifloating Shaft Couplings are described in new four-page Brochure Form 99. These couplings are used where machines are spaced apart and only one bearing is provided for one of the machines. Parallel misalignment is eliminated and only angular misalignment needs to be taken care of, the maker says. This results in an economical layout and saves space. Such radial loads as V-belts, chains, generator, or motor armatures can be supported without the use of pilot bearings. **Write or call: Thomas Flexible Coupling Co., Warren, Pa., for Brochure Form 99.**

•

Portable Pipewall Thickness Gage is reviewed in new Bulletin NI 157. The operation of this lightweight—7½ lb. —gage providing a nondestructive method of determining the extent of corrosion, erosion, or scale buildup on pipe walls is described in the booklet. Illustrations and pictures show the various applications of the gage. The features of the gage are graphically displayed. **Write or call: Industrial Nucleonics Corp., 1205 Chesapeake Avenue, Columbus 12, Ohio, for Bulletin NI 157.**

•

Silent-Chain Drives Book 2425 contains 88 pages of detailed engineering data and illustrations on silent-chain operations. The chain's proven efficiency of better than 98 per cent is unaltered by wear, temperature, or atmospheric conditions, the maker says. It can be operated on short centers at ratios as high as 10 to 1. Tables of service factors, ratings, chain length, and center-distance computations are included. Preengineered stock drives are listed in one 16-page section. A 22-page section outlines the procedure for selecting engineered drives. **Write or call: Link-Belt Co., Prudential Plaza, Chicago 1, for silent-chain drives Book 2425.**



many more hours on stream without forced shutdown with NATIONAL AIROIL

OIL-GAS TANDEM COMBUSTION UNITS

Exclusively for vertical firing, the new National Airoil VERTICAL Tandem Block Units retain all the features of our regular horizontal Tandem Units . . . *plus:* special, pre-cast refractory shapes for easier, cost-saving vertical installation and maintenance; secondary air inlet louvres for positive control of vertical flame pattern; and, all steel duplex detaching gear which enables swift, simple vertical burner changeover.

VERTICAL and HORIZONTAL Tandem Units hold air in the combustion zone until fuel and heated air are thoroughly mixed. This means that ignition takes place in a hot zone; the result: high fuel economy through more rapid combustion with a minimum of excess air. NATIONAL AIROIL's patented Tandem Combustion Units allow secondary air to be easily and accurately controlled. By adjusting air control louvres, flame can be shaped to radiate heat uniformly without tube impingement.

The VERTICAL or HORIZONTAL Tandem Unit is always fired with NATIONAL AIROIL Combination Oil and Gas Burners . . . has a high turndown ratio with a steady flame temperature using either fuel oil or gas. With the TANDEM UNIT'S clean flame, a cold furnace can be brought to full capacity in a short time.

"Many, many more hours on stream, without shutdown" . . . yes, YOU will realize higher profits from YOUR heaters when NATIONAL AIROIL VERTICAL or HORIZONTAL Tandem Units are specified. Our new Bulletin 498 is yours for the asking.

NATIONAL AIROIL BURNER CO., INC.

CHEMICAL-PETROLEUM DIVISION

Main Office & Factory: 1236 EAST SEDGLEY AVE., PHILADELPHIA 34, PA.

Southwestern Division: 2512 South Boulevard, Houston 6, Texas

INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

"M/V Grand 33" Goes Into Service for Milwhite . .

to deliver drilling mud material in bulk to offshore drilling locations in the Southeast Louisiana area. The 118-ft. vessel can transport up to 200 tons of bulk mud weight material, as well as 2,000 100-lb. sacks on deck, at 10 m.p.h. The bulk material can be delivered to a drilling rig's tanks through the vessel's lightweight, 250-ft. hose at the rate of 100 tons per hour. The ship is equipped with radio and radar units and powered by twin GM 6110 Series diesels.

George Connor is vice president and operations manager of Milwhite Mud Sales Co.

U. S. Industries to Acquire Venezuelan Firm

Oil Field Sales & Service, S.A., a Venezuelan corporation which distributes and services oil-field equipment and tools in Venezuela and Colombia, will be acquired by U. S. Industries, Inc., according to John I. Snyder, Jr., president of USI.

Products sold by Oil Field Sales & Service include oil-well-completion equipment, surface equipment, artificial lift and fishing equipment. Stores, warehouses, repair shops and service facilities are maintained in the Anaco, Maracaibo and Tia Juana oil regions of Venezuela. In addition to its marketing activities, the firm provides engineering assistance, field service, and supervision of the installation of the special tools it sells for drilling, completion and production activities.

Gardner-Denver Broadens Pump Distribution . .

to the petroleum industry by appointing Jones & Laughlin and Continental-Emsco Co. as codistributors. In California, the Republic Supply Co. of California will continue to be exclusive distributor of Gardner-Denver Co. pumps and parts there, according to George Gutekunst, vice president in charge of sales.

Continental-Emsco has been distributor for Gardner-Denver pumps for 30 years.

Gardner-Denver has manufacturing plants in Quincy, Ill., Grand Haven and Reed City, Mich., Denver, Colo., Dallas, Tex., La Grange, Mo., Woodstock, Ont., Johannesburg, South Africa and Rio de Janeiro, Brazil.

Severson Manages New Ampco Metal Branch . .

in Garland, a suburb of Dallas, Tex. Raymond J. Severson joined Ampco Metal, Inc., in 1943 and held a number of supervisory positions in manufacturing. Since becoming assistant general sales manager in 1955, he has been largely responsible for exploration of the present and potential markets for Ampco's products in the Southwest.

The Garland plant will be completed by April.

National Supply Co. of Venezuela Opens Store . .

at Barinas in western Venezuela. This is the company's fourth store, the others being at Maracaibo and Las Morochas in the west and Anaco in the east.

R. S. Bernstein is store manager. National Supply Co. of Venezuela, C.A., is a subsidiary of The National Supply Co., Pittsburgh, Pa.

Mid-Continent Supply Co. Executives Are Promoted

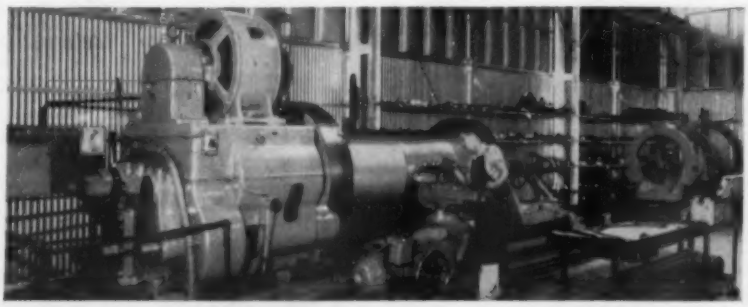
New general office and personnel manager is J. P. Jones, and new assistant general manager of sales is J. H. Kenyon, according to President Ken W. Davis.

J. P. JONES

J. H. KENYON

Jones, former assistant to general division manager, has been with Mid-Continent 16 years. He served in the Gulf Coast division before moving into the Fort Worth headquarters last year.

Kenyon, who is a veteran of 10 years' service with Mid-Continent, formerly was in the machinery division.



This Lathe Important in Diesel Parts' Specialty . .

of manufacturing replacement parts for all marine and stationary diesel engines which are not in current production. The company recently installed a Niles Behmoth Pond 57-in. lathe with 40-ft. centers. A typical job handled on this lathe is the machining of hydraulic press cylinders weighing 16,000 lb. An 8-in., 10-ft. horizontal boring mill is also available. For work on cylinder heads, Diesel Parts has a 60-in. Bullard vertical mill. About 65 per cent of the firm's work is for export.

Diesel Parts & Service, Inc., Tulsa, was established in 1952 with John L. Berggren as president.

There is a distinct advantage in "divided responsibility" when this "responsibility" represents specialists in their own field of endeavor.

At Flint, four distinct divisions,

FABRICATED PLATE

TOWER and SUBSTATION

STRUCTURAL and REINFORCING

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Gooch Ends Brazil Trip For American Iron . .

after spending a major portion of his time in the Amazonos and Bahia districts. A. E. Gooch, assistant chief engineer for American Iron & Machine Works Co., Inc., Oklahoma City, made the trip to further relations and sales potential in this area as well as to assist and instruct Petrobras in the use and maintenance of American Iron products in use in Brazil.

Gooch's trip was set up and directed by Pio Castagnoli who represents Cia. National de Sondagens, the authorized distributors of American Iron products in Brazil.

Ramo-Wooldridge, Thompson Products Form New Company

The new subsidiary corporation, to be known as Thompson-Ramo-Wooldridge Products, Inc., will concentrate its efforts on industrial process control. It will market as its first major product, the RW-300 digital control computer. Installation of the first RW-300 is under way for The Texas Co. at Port Arthur, Tex., where it will control a polymerization unit.

Management appointments include Dr. Dean E. Wooldridge, president; Dr. Joseph F. Manildi, general manager; Dr. Montgomery Phister, Jr., director of engineering; Raymond E. Jacobson, director of marketing; and Robert J. Barrett, Jr., controller. Wooldridge will continue to serve as president of Ramo-Wooldridge Corp.

Offices for Thompson-Ramo-Wooldridge will be at the Ramo-Wooldridge Center near Los Angeles International Airport. Ramo - Wooldridge will develop new products and manufacture equipment for the new firm at its newly activated manufacturing facility in Denver, Colo.

Sittmann, Baltzell Head New Oakite Divisions . .

which have been added to the field organization. Walter G. Sittmann heads the new upper New York State division, headquartered in the Fitch Building, Rochester. John P. Melhado will replace Sittmann in Pittsburgh as division manager. Manager of the new Mid South division is Victor L. Baltzell.

The New York division includes technical field representatives and warehousing facilities now based in Albany, Utica, Syracuse, Binghamton, Elmira, Rochester, Buffalo, and Scran-

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"Varec" PULSE CODE reads SAFE—if a pulse is lost or gained you get no reading, not an incorrect reading. "Varec" PULSE CODE can give you an accurate, dependable telemetering system—over unlimited distance using any type single communication channel—for remote gauging of liquid level, temperature reading, and remote control of valves and pumps. It can provide an automatically printed record through an electric typewriter or tape printer. It does the work formerly requiring many field men, infinitely more accurately, and has an amazingly fast pay-out.

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ton, Pa. The Mid South division will consist of representatives in Cincinnati, Nashville, Little Rock, Knoxville, Louisville, Evansville, Jackson, Shreveport, Memphis and New Orleans, and will have headquarters in the Commonwealth Building, Louisville.

Sittmann, with Oakite Products, Inc., 21 years, was for 7 years field representative in northern Indiana before his appointment as Pittsburgh division head in 1953. Melhado, who joined Oakite in 1949, was formerly field representative in New York City. Baltzell has been representative in Dallas for the past 15 years.

Ampco Metal Broadens Sales Division . .

by establishing three new sales managers' posts. New sales managers reporting to J. P. Henry, vice president and general sales manager, are F. E. Garriott, sales manager of finished products; I. S. Levinson, technical products; and G. E. Brown, field sales. These appointments were announced by J. D. Zaiser, president.

Garriott, with Ampco Metal, Inc., since 1944, formerly was manager of the Weldrod and wire department. Levinson was product manager in charge of process industries sales and has been with Ampco since 1949. In his 11 years with the firm, Brown has held various sales assignments, the most recent being Wisconsin district manager.

Motorola Names R. G. Jones Microwave Mgr. . .

R. G. JONES

for its 10-state western area. Jones will direct microwave sales activity from the Burlingame, Calif., office of Motorola Communications & Industrial Electronics Division, according to Walter C. Byrne, microwave national sales manager.

Jones has been with Motorola since 1956 as an industrial communications sales representative in the Midwest area.

John C. McIntosh Joins Cathodic Protection . .

as sales manager of its newly formed protective coating division. He will direct the company's full scale development program in the protective coating field with emphasis on its renewed efforts as a distributor for Polyken protective tape coatings.

McIntosh will headquarter at Cathodic Protection Service's main office in Houston. He has had many years of experience in sales and field service for Polyken tapes.

Milton Roy Co. Assigns Four Representatives . .

to handle the needs of its customers for controlled volume pumps and chemical instrumentation systems.

New representatives include Brosey & Frew, Indianapolis, serving a major part of the Indiana area; Bernhard Engineering Sales Co., Dallas, serving North Texas; Tate Engineering, Inc., Richmond, for the State of Virginia; and in the central and southern part of Kentucky, Jay Instrument & Specialty Co., Louisville.

These firms have been serving the chemical processing industries for many years. They recently completed a training course at Milton Roy's main plant at Philadelphia.

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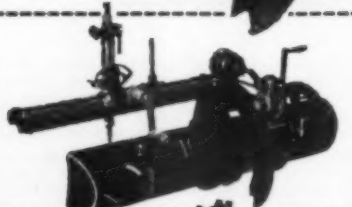

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Steven and Whiting Named By Worthington Corp. . .

to new posts. George Steven has been appointed assistant general manager of the compressor and engine division in Buffalo, N. Y. Harold W. Whiting succeeds Steven as manager of engineering.

Steven, who has been with Worthington 31 years, has been manager of engineering since 1945. Whiting, who joined the firm in 1939 as a design engineer, has served successively as assistant chief engineer and chief engineer of the compressor section and has been assistant to the manager of engineering since 1952.

International Tool & Supply Co. Formed . .

by Bob Chadderdon and Earl Stone to deal directly with foreign operations The new company, headquartered in New York City, represents several of the leading oil-field manufacturers whose products pertain to all phases of the oil industry.

Bob Chadderdon, president, and Earl Stone, vice president, worked extensively in oil fields of Oklahoma, Texas, Louisiana and the Rocky Mountain area before going to New York.

Oil Well Supply Division Appoints Prudhomme . .

PRUDHOMME

assistant manager, engine and compressor sales, according to M. F. Hazel, vice president of sales.

Robert J. Prudhomme was employed in 1952 as assistant district engineer, engine and compressor sales, at the division's Dallas headquarters. He was appointed district engineer, engine and compressor sales, in 1955, and held this position prior to his present appointment.

Levingston Names Manager Of Vazca Facilities . .

now under construction. Johannes A. Van Den Hoek has been named manager of Vazca, Venezuelan shipyard to be operated by Levingston Shipbuilding Co. of Orange, Tex., it has been announced by Ed T. Malloy, president.

Vazca (Varadero y Astillero Del Zulia Compania Anonima), a Venezuelan corporation in which Levingston is a stockholder, will be operated by Levingston under a management contract.

The new enterprise, located on the west shore of Lake Maracaibo about 13 miles south of the city of Maracaibo, will build and repair all types of marine equipment, as well as engage in general fabrication. Construc-

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Wallace & Tiernan Volumetric Feeders accurately feed all dry chemicals used in water and waste treatments in the range between 0.1 and 1000 pounds per hour. Send for information about W&T Dry Chemical Feeders—Bulletin #I-61.

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tion of Vazca's initial facilities, two marine ways, wharves and bulkheads, is now under way.

Detroit Diesel Begins Ninth Plant Expansion . .

with completion expected next May. According to Clyde W. Truxell, general manager, the 289,000-sq.-ft. addition will house all final assembly, testing and shipping facilities for Detroit Diesel Engine Division of General Motors Corp.

An entirely new production system will be installed, including the addition of two new assembly lines for a total of five assembly systems. The new addition will increase floor space to 1,520,000 sq. ft. There are six main buildings and a laboratory on the division's 120-acre site.

Mueller Co. Names Gannon As General Sales Mgr. . .

DAN R. GANNON

according to W. H. Hipsher, executive vice president of the Decatur, Ill., company.

Dan R. Gannon joined Mueller in 1929 as a sales representative. He became Southwest sales manager in 1953, and in 1955 was appointed western sales manager, directing West Coast sales activities from Los Angeles. He returned to Decatur in 1957 to serve as field sales manager.

Weksler Thermometer Changes Its Name . .

to Weksler Instruments Corp. According to Edward P. Dobrin, president of the Freeport, N. Y., firm, the change is the result of the Weksler line becoming increasingly wider and more diversified. Today over 31 per cent of the Weksler instruments are for use in pressure applications and over 12 per cent in the area of humidity. The change in corporate name is for clarification and more accurate designation of the company's activities.

Hunsacker Names Wolfe . .

as representative in the Tulsa area. The Hunsacker firm is located in Dallas, Tex.

According to R. B. Hunsacker, president of Hunsacker Trucking Contractors, Inc., Wolfe formerly was purchasing agent for British-American Oil Producing Co.

Crose Opens New Office in Elizabeth, N. J. . .

to serve the eastern seaboard with a complete line of pipeline construction equipment. M. J. Crose Manufacturing Co., Inc., recently moved its eastern division from Newark to this new $60,000 office and warehouse, according to Dave G. Wagner, manager of the eastern division.

The company's manufacturing facilities are centered in Tulsa, with the Cinch manufacturing division being at Houston.

Callans, Reeves Named in Baldwin-Hill Shifts . .

of area managers. T. J. Callans has been appointed eastern area manager, industrial insulation division, and C. R. Reeves has been named to replace Callans as Midwest area manager.

Callans will direct the company's eastern industrial sales division from the main office in Trenton. Formerly divisional manager of the Baldwin-Hill Co.'s manufacturing operations in Kalamazoo, Mich., and Huntington, Ind., Reeves will direct the Midwest industrial sales division from offices in Chicago.

Pipe Line Service Corp. Elects J. E. Thompson . .

vice president and to the board of directors. Thompson has been with the firm since February 1957. Prior to that he served 11 years with Standard Oil Co. (N.J.) subsidiaries, including 6 years with Interstate Oil Pipe Line Co. in the U. S. and 5 years with Creole Petroleum Corp. in Caracas and Tia Juana, Venezuela.

Pipe Line Service Corp., a subsidiary of American Steel Foundries, specializes in mill-coating of pipe. Besides the home office and plant in Franklin Park, Ill., the company has plants in Monmouth Junction, N. J.; Sparrows Point, Md., Glenwillard, Pa.; Corpus Christi and Longview, Tex.; Harvey, La.; and Provo, Utah.

Beacon Opens New Office, Transfers Personnel

A new sales office has been opened in the Petroleum Building, Amarillo, Tex., with J. H. (Jack) Haley as representative. John M. Gill has been appointed store manager of the Pampa, Tex., store, and Bill J. Alexander as field representative at that point.

Haley has been associated with the oil-field supply business for the past 12 years, having been located in the Texas Panhandle and the Gulf Coast area. Gill, who joined Beacon Supply Co. in 1946, has served as store manager at Borger and field representative at Pampa. Alexander was employed by Beacon in 1955 at Borger and has served as assistant store manager at that point.

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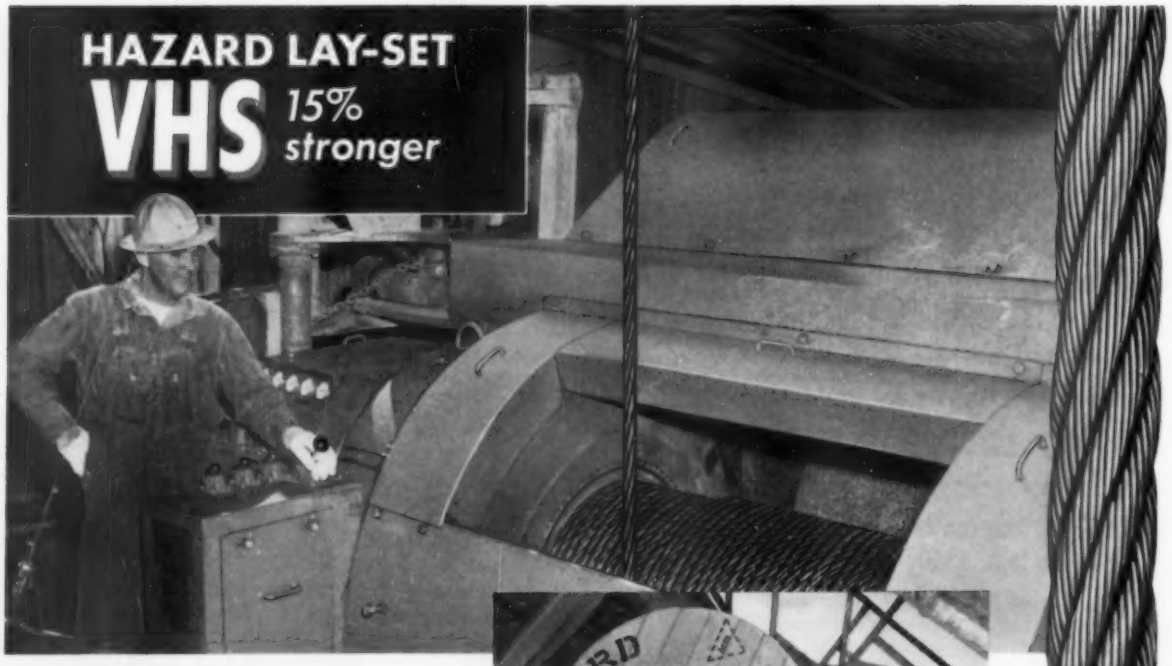

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POINT 2 • Buy Lay-Set VHS in the Longest Practical Length With ample line reserve, cut-offs can be averaged out to distribute wear and fatigue economically throughout the entire line.

POINT 3 • Follow a Definite Cut-Off Schedule Select a predetermined cut-off schedule and follow it to the letter! This way you get greater serviceability from lines based upon the exact requirements of your rig.

We have a field representative in your area to help you in selecting the right cut-off practice for your lines. He'll give you a Ton-Mile Record Book containing reference tables and forms to assist you in carrying out his recommendations.

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PLANTS IN WILKES-BARRE, PA., AND HOUSTON, TEXAS

RED RIVER-ORDOVICIAN oil shows in a gross 121 ft. of section have indicated a new oil field for Divide County, North Dakota. Kerr-McGee Oil Industries, Inc., et al reported the field prospect at its 1 Johnson Estate.

We're saying again—and louder . . .

WATCH WILLISTON

By Frank J. Gardner
Exploration Editor

THIS IS THE TIME of year for crystal balls. Every publication is expected to predict the major trends in its field for at least a year ahead. And the Journal is no exception. In next week's issue, you'll see forecasts for every phase of the oil business. In the exploration section, you'll see some flat predictions . . . more positive and a bit more blunt than we've dared to print in the past.

Among these exploration prophecies, you'll find several devoted to the Williston basin. Of these, perhaps the boldest, is that "Williston will bust wide open." For that's exactly what we expect it to do.

Enormous enrichment . . . Three months ago, this column hinted hopefully that Williston would surpass the Paradox basin in industry favor during 1958. Events since then would seem to change the hope into a certainty. Year-end figures on drilling activity credited Williston with the most successful year in its history; year-end discoveries herald an even greater year ahead; and a year-end review of the oldest field in the basin suggests that Williston reserves are in for enormous enrichment soon.

In 1957, North Dakota operators drilled 149 wildcats; 24 of these opened new fields. This 16 per cent success ratio is well above the national average. In 1958, it should improve. Of 167 North Dakota development wells in 1957, 151 were hits; and other basin states did almost as well . . . where can you do better? The real "new boom" didn't begin until mid-'57. As it accelerates into 1958, we can look for some sensational discovery news.

Via discovery headlines . . . Already, the year is off to a good start along this line. Bowman County, North Dakota, just had its first oil well. Carter Oil Co. 1 Johnson, 9-129n-106w, in the extreme southwest corner of the state, made a Red River-Ordovician oiler at 8,206-48 ft. with a flow of 195 bbl. of 30.5°-gravity oil per day. This not only added a new oil county to the North Dakota roster, but also marked the first oil production on the southeastern limb of the great Cedar Creek anticline in that part of the state.

At about the same time, the Red River made discovery headlines in the extreme northwest corner of the state. In western Divide County, 34-162n-101w, Kerr-McGee Oil Industries, Inc., Argo Oil Corp., and Dakamont Exploration Corp. reported Red River shows at the 1 Johnson Estate. Here is a remote wildcat 48 miles east of Montana's 1957 Ordovician discovery-of-the-year at Outlook. It is about 40 miles southeast of Imperial Oil, Ltd.'s tentative Ordovician strike at the Hummingbird 6-13-2-19 in southeastern Saskatchewan. And it's 35 miles west of oil production on the Nesson anticline.

Kerr-McGee reports three separate shows on drill-stem tests of a gross Red River pay section 121 ft. thick. These were at 11,236-11,300, 11,262-80, and 11,297-11,357 ft. Sample top of the Red River was called at 11,006 ft. Operators are drilling ahead at 11,570 ft. now, groping for the Winnipeg within the next 100 to 200 ft.

The 1 Johnson was located on a seismic prospect on a unitized block of 960 acres. Its showings have set off a wave of new leasing in the vicinity of the strike. If it makes a well, the deep Ordovician play will blanket all of southern Saskatchewan, eastern Montana, and western North Dakota.

Will bust wide open . . . This discovery, plus the Outlook strikes, plus the Hummingbird show, all add up to oil-finding news of the utmost importance. You can expect to hear more and more of the Ordovician throughout Williston. Couple this with the whirlwind Mississippian play in the border counties of Burke, Bottineau, and Ward, and you'll understand why we say "Williston will bust wide open" in 1958 and beyond.

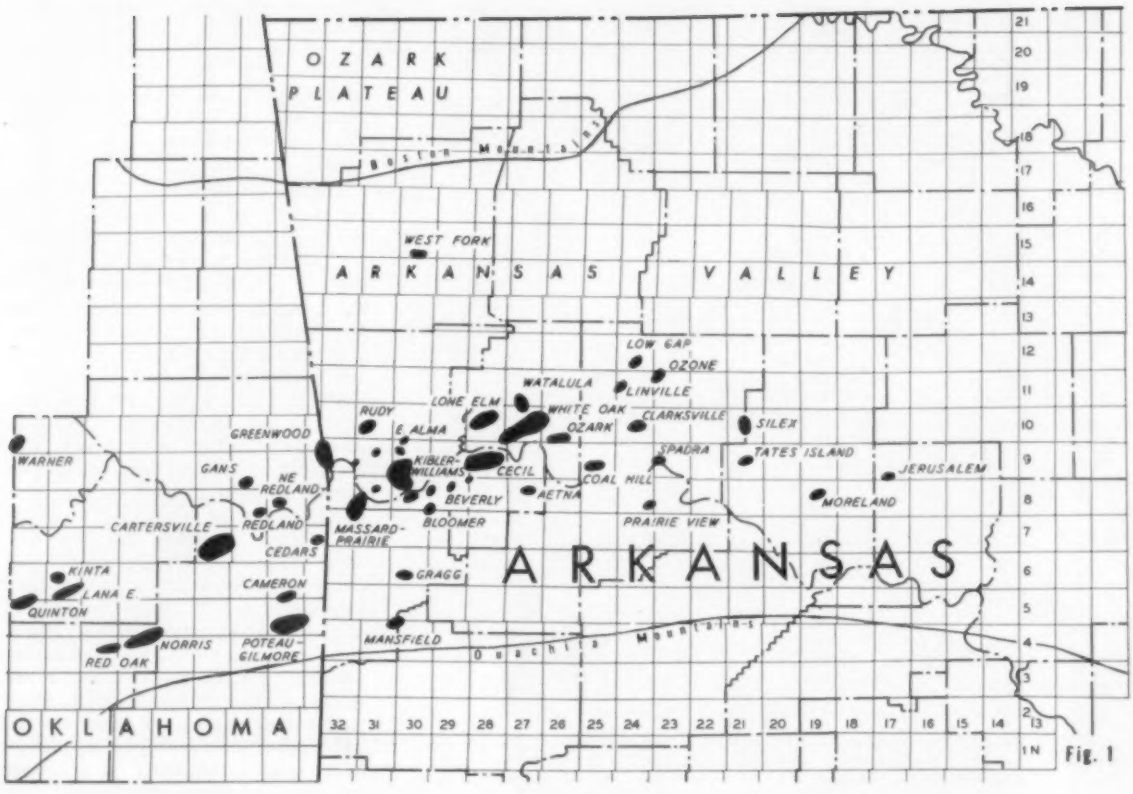


Fig. 1

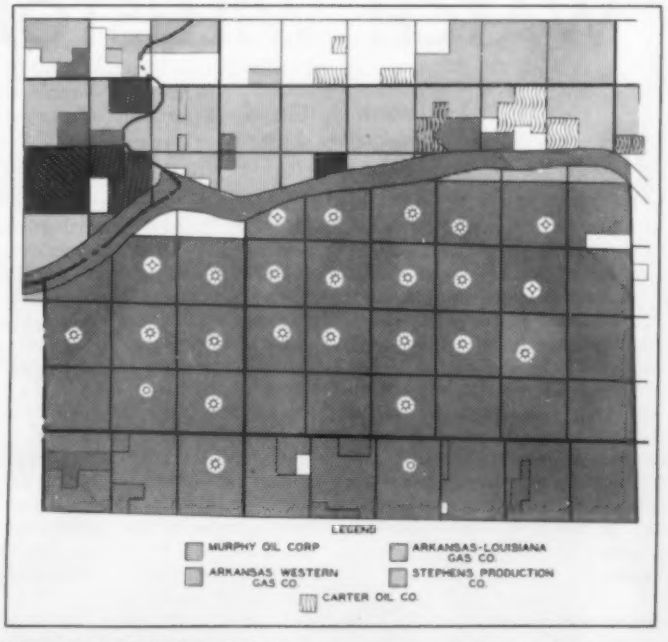
Recent gas-producing techniques have oil men taking a second look as . . .

Exploration Steps Up in Arkansas Valley

By Norman S. Morrisey
Drilling-Development Editor

NORTHERN ARKANSAS is the surface geologist's dream in an age of sample running, subsurface geology, and accent on geophysics. Surface anticlines abound, some 50 miles long. The entire Arkansas Valley (Fig. 1) is divided into a series of east-west-trending anticlines and synclines that cut the terrain up into hills and valleys.

Better completion techniques and improved drilling methods have forced operators to reevaluate the long-ignored Arkansas Valley. Production is entirely gas to date and the pay zones are sands in the Atoka and Morrow section of the Pennsylvanian. During the past 5 years, oil and gas companies have snatched up all available leases on the prominent surface structures throughout the valley. Now they are beginning to process the



WITH AN ALLOWABLE of 51 M.M.c.f. per day, Cecil, one of the newer gas fields in Northwest Arkansas, produces from Hale and Atoka sand.

blocks with very encouraging results.

One major oil company has drilled three wildcats and brought in two commercial discoveries. Another major has drilled 27 wells in the area, 17 wildcats and 10 fie'd wells. The outcome of this drilling program has been gratifying: 5 successful wildcats and 10 field wells for an over-all drilling success of 56 per cent and a 29 per cent record on wildcats.

Surface geology has been the best exp'oration tool to date in northern Arkansas. Most field geologists use aerial photos and wind up with an aerial mosaic complete with structural contours, fault and outcrop locations, and other features. Some companies use two-man field parties, others prefer one-man operations. The rugged terrain and complex geology make seismic work too expensive to be feasible at this stage in the exploration cycle. Some companies have used core drills where the surface outcrops are covered by alluvium.

The principal outlet for gas production to date has been local markets, but operators are looking down the road to the day when there are sufficient reserves to justify a pipeline to the East and Northeast. Once this point is reached, development and exploratory drilling will increase rapidly.

Geology[1] . . . The Arkansas Valley is a westward-trending structural and topographic trough. It lies between the essentially flat-lying rocks of the Boston Mountains on the north and the complexly folded strata of the Ouachita Mountains on the south, and varies in width from 25 to 35 miles. It extends from the Oklahoma boundary eastward to the Gulf Coastal Plain. In Oklahoma the Arkansas Valley extends into what is known as the McAlester basin which is the same structurally and stratigraphically as the Arkansas Valley. The Arkansas Valley is gently undulating plain, most of which stands between 300 and 600 ft. above sea level but reaches a maximum height of more than 2,800 ft.

The Arkansas Valley has some of the structural characteristics of both its bounding provinces. It is a synclinorium in which the beds are rather closely folded near its southern border, with the folds becoming progressively more open toward the Boston Mountains. The structural axes generally trend westward, but some deviate notably from that direction. Most of the anticlines in the southern part of the valley are asymmetrical in that their north limbs are steeper than their south limbs; many near the center of the valley are nearly symmetrical; and some near the north border are slightly asymmetrical, but here most of the south limbs of the anticlines are slightly steeper than the north limbs.

Large thrust faults are common south of the Arkansas River but are infrequent north of it. Normal faults are found throughout the province but are more common north of the Arkansas River. In most parts of the province the topography is an expression of the structure. Broad, open synclines are expressed by high, flat-topped mountains; steeply tilted limbs of anticlines and synclines are generally expressed by sharp ridges, some of which are many miles long.

The rocks of the province are nearly all of sedimentary origin; they include only a few intrusive igneous rocks. Most of the sedimentary rocks ex-

TABLE 1 — GEOLOGIC UNITS PENETRATED IN ARKANSAS VALLEY WELLS[2]

System and series—	Formation	Member	Max. thickness in feet
Pennsylvanian:			
Des Moines	Hartshorne ss.		160
Atoka	Atoka fm.		(?)
Morrow	Bloyd sh.	Kessler ls.	589
		Brentwood ls.	
	Hale fm.	Prairie Grove	650
		Cane Hill	
Springer	Jackfork fm.		(?)
	Stanley fm. (?)		(?)
Mississippian:			
Chester	Pitkin ls.		219
	Fayetteville sh.		297
	Batesville ss.		
Meramec	Ruddell sh.		457
	Moorefield fm.		
Osage	Boone fm.		388
Kinderhook			
	Chattanooga sh.		70
Devonian:			
Ulsterian	Penters chert		260
Silurian:			
Niagara	Lafferty ls.		254
	St. Clair ls.		
Alexandria	Brassfield ls.		
Ordovician:			
Cincinnati	Cason sh.		57
	Fernvale ls.		108
Champlain	Kimmswick ls.		400
	Plattin ls.		
	Joachim dolo.		117?
	St. Peter ss.		158
	Everton fm.		1,180
Canada	Powell dolo.		210
	Cotter dolo.		400

TABLE 2 — GAS PRODUCTION IN NORTH ARKANSAS[3]

Field—	Pool—	Producing acres	Allowable M.c.f.
Aetna	All sands	5,750	7,788
Cecil	Hale	10,240	20,766
Cecil	Atoka	12,965	29,961
Gragg	Atoka	4,480	7,911
Jethro	Atoka	4,480	4,293
Jerusalem	Atoka	2,560	5,475
Kibler-Williams	Atoka	640	1,320
Massard	Hale	696.7	6,750
Massard	Basal Atoka	2,655.85	10,188
Lone Elm	Sandstone	7,040	18,525
Moreland	Hale, Atoka	3,840	24,213
Rudy	Atoka	640	188
Rudy	Hale	640	624
West Fork	Sylamore	219	1,032
White Oak	Sandstone	19,968	40,680

posed consist of shale and sandstone; conglomerate is uncommon, and calcareous rocks are rare. The formations exposed belong to the Carboniferous system, and nearly all to the Pennsylvanian series. The maximum thickness of the Paleozoic rocks in the Arkansas Valley is estimated to be about 30,000 ft., of which at least 15,000 ft. are exposed (Table I).

Gas production[1] . . . Although no commercial quantities of oil have been discovered in the province, natural gas has been produced from sandstones of the Atoka formation for many years and from the Kess'er and Brentwood limestone members of the Bloyd shale, and the Prairie Grove member of the Hale formation in recent years (Table 2). In addition, small supplies of gas have been developed from the Boone formation for farm use in northwestern Arkansas.

The Atoka ranges from 0 to 10,000 ft. in thickness and contains numerous sand beds which are locally productive over relatively short lateral distances. The Kessler and the Brentwood members of the Bloyd shale and the Prairie Grove member of the Hale are limes, limy sands, and sands. They range in thickness from 0 to 300 ft. and are productive in several fields in the western half of the Arkansas Valley.

The present trend of gas exploration in the province is to drill to the base of the Morrow group, testing the Atoka and Morrow sands as thoroughly as possible. This is being done by expansion of the old fields, extending the production farther east into virtually untested portions of the Arkansas Valley, and into outlying fringe areas toward the Ouachita and Boston Mountain fronts.

Pre-Pennsylvanian production possibilities remain to be evaluated in the Arkansas Valley as all the rocks older than the Morrow group have scarcely been touched by the driller's bit. There are many possible gas and oil reservoirs here, such as the Wedington sandstone member of the Fayetteville formation and the Batesville sandstone of Mississippian age. The St. Peter sandstone and the Everton formation of Ordovician age also have good possibilities, not forgetting that the program for testing the Atoka formation and the Morrow group is just reaching full scale.

References

1. This information was supplied by Arkansas Geological and Conservation Commission.

2. Ballard, William Wayne, "Subsurface Study of Morrow and Atoka Series in part of Arkansas Valley of Western Arkansas," Bull. AAPG, Vol. 41, No. 2, February 1957, pp. 263-277.

EXPLORATION HIGHLIGHTS

COMBINATION SURFACE structure and place-fix map shows location of tests in San Miguel County. Axis of anticlinal trends are indicated by arrows.

In New Mexico

Big Lease Play Reported

Reports of heavy leasing, plus a third Precambrian test for San Miguel County, brings the area back into the news again.

Latest drill project was announced by Capital Petroleum Co., of Wichita Falls, Tex. Plans call for a 7,000-ft. or basement test on Hampton Ranch land. Exact location in the NW NW 9-13n-30e, falls on the southeast flank of the Canadian surface anticline.

Leasing picks up . . . Within the last 6 months the area has had relatively large lease plays, with leases going for $1 an acre. Late reports show some leasing going as high as $5 per acre. Capital Petroleum is said to hold some 50,000 acres under lease. Major oil companies in the area are Shell Oil Co. and Continental Oil Co.

One test down . . . Miami Petroleum Co., Abilene, has finished one San Miguel County wildcat and at this writing was drilling below 6,314 ft. on another.

While both wells expected to find Precambrian granite around 7,000 ft., Miami 1 Bell Ranch, the most northwesterly test on the accompanying map, drilled into basement rock at 2,672 ft., and was finished with no shows reported.

Miami 1 Hoover Ranch, near the crest of Johnson dome, was still drilling early last week, with total depth at 6,314 ft.

Old testing ground . . . Maps show this entire area, which is about 80 miles north of nearest oil production in Roosevelt and Lea counties, to be studded with dry holes. Nomenclature on the map indicates that many of them had gas shows, and a few had

EXPLORATION THIS WEEK

New Mexico	196
Alaska	197
Arkansas	197
Arizona	197
Rocky Mountains	197
Canada	198
Appalachian	198
California	199
Michigan	199
Oklahoma	202
Texas	206
Kansas	206
Mississippi	206
North Dakota	207

oil shows. Drilling, however, dates back 20 years or more, at which time drilling for gas was highly unprofitable due to lack of outlets.

NEW MEXICO

NORTHWEST

Two Gallup Wells Finaled North of Bisti

The area between Bisti and Blanco fields in San Juan County gained two new Gallup wells. O. F. Featherstone 1 Roberson, C SW NE 36-27n-13w, flowed 100 bbl. of oil per day from the Gallup sand. The 2 Roberson, C NE NE 36-27n-13w, pumped 432 bbl. of oil per day from Gallup sand perforations at 5,075-5,111 ft.

ALASKA

Second Kenai Test Holds Alaska Interest

Richfield Oil Corp. was nearing the programed total depth on 2 Swanson River unit, the first offset to its 1957 Kenai Peninsula discovery well. The operator was coring below 10,580 ft. at last report with 11,200 ft. tabbed as the depth when results should begin to show up.

- In other Alaskan activity, Anchorage Gas & Oil Development Co. has suspended operations for the winter on the 3,570-ft. 5 Rosetta, about 30 miles north of Anchorage and 70 miles north of Kenai Peninsula operations.
- In southern Alaska, Colorado Oil & Gas Corp. was fishing at 9,777 ft. on A-1 well in the Yukatat area of Tongass National Forest. In the Widebay-Kanatak area, Humble Oil & Refining Co. was drilling at 6,473 ft. on 1 Bear Creek unit. This is 280 miles southwest of the Kenai discovery area.

ARKANSAS

Hill Sand Well Extends West Bradley Production

West Bradley field, in southwestern Lafayette County, is being extended ¾ mile north by a Rodessa-Hill sand well completed by J. I. Roberts.

The extension well is Roberts' 1 Walding-Waller, in 34-19s-26w. It flowed at the rate of 224 bbl. of 43°-gravity oil per day when tested through ⅛-in. choke.

Its pay is perforated at 5,884-90 ft. in hole drilled to 6,068 ft. The field's Mitchell sand, topped at 6,030 ft., also carried oil shows.

ARIZONA

Cochise Wildcat Is Set

Sterling Oil of Oklahoma, Inc., Tulsa, and L. A. Thompson with Robert Manley, both of Los Angeles, have set 500 ft. of surface pipe at their 1 State of Arizona, NE NE 2-24s-31e, Cochise County, extreme Southeast Arizona. Thompson and Manley, who will jointly operate the test, are now moving rotary tools to the location, approximately 26 miles east of Douglas.

Operators acquired a one-half interest, as a farmout, in a block of 27,000 acres from Sterling Oil. The Oklahoma firm assembled the acreage following surface study, supported by a detailed magnetometer survey of the prominent geological feature now being drilled.

Acreage assigned the operators calls for two wells to 5,500 ft., sufficient to test Ordovician sediments.

A geological study of the structure indicates a closure of at least 1,000 ft. in the Permian; exposed at the surface. The feature is known as the Guadalulpe structure, contained in the Guadalupe basin which extends south into Mexico.

Prospective formations, suitable as oil and gas reservoirs, are expected in Pennsylvanian, Mississippian, Devonian strata. Geological study indicates all of these should be present below the Permian.

DRILLING WILL BEGIN on a 5,500-ft. Ordovician wildcat in southeastern Arizona's Cochise County. The well will be drilled by L. A. Thompson and Robert Manley on the Guadalupe structure of the Guadalupe basin.

Nygaard Offset Well Completed on Pump

Petroleum Corp. of America and Jom Jordan completed the 1 Anderson in C NW SE 29-163n-90w, Burke County, on pump for 50 bbl. of oil per day. Production is from the Nesson-Mississippian at 5,770-78 ft.

ROCKY MOUNTAINS

COLORADO

Gages Reported at Routt County Oil Strike

Oil production is reported at Tennessee Gas Transmission Co.'s 1 USA-James in NE NE NE 25-6n-86w, Routt County, 5 miles from Tow Creek field production. The well pumped 183 bbl. of oil in 24 hours open hole in the Niobrara at 4,094-4,800 ft.

Commission Names New Fields in Colorado

Six new field names were approved by the Oil and Gas Commission of Colorado. New fields are: Antelope, Weld County, opened by Stuarco Oil Co. 1 Dickerson, C SE NE 18-6n-66w; Vim, Weld County, opened by Shell Oil Co. 1 State, C NW SE 16-11n-58w; Rift pool, Logan County, opened by Brack Drilling Co. 1 Haynes, C SW SW 14-8n-48w; Topaz field, Washington County, opened by Petroleum, Inc., 1 Peck-C, C SE SW 15-1n-54w; Fremont Butte, Washington County, opened by Davis Oil Co. 1 Kline, C NE SE 12-3n-53w, and Doherty pool, Adams County, opened by J. Glenn Johnson and Miracle Fifer Drilling Co. at 1 Anderson State, C SW SW 16-2s-65w. All these new fields are in the Denver basin.

WYOMING

New Field Names Approved by Committee

The state field names advisory committee has named five new fields in Wyoming and labeled extensions to existing pools.

The new field names are: South Donkey Creek, Crook County, opened by True Oil Co. at 2 Koch, C NW NW 20-49n-68w; Trail Ridge, Fremont County, opened by Gulf Oil Corp. 1 Federal in C SW NW 9-27n-95w; Lost Cabin (formerly South Lysite), Fremont County, opened by The California Co. 1 Spratt, SE SE 5-38n-90w, and Fortification Creek, Johnson County, opened by D & D Drilling Co. 1 Leiter, C NE SW 21-52n-77w (noncommercial).

CANADA

Weather Hurts Exploration

The whimsical weather which since the first of the year has been anything but seasonal, is playing havoc with the well-laid plans of western Canada's oil and gas-exploration companies. Under normal conditions, companies working in the far northern reaches of the exploration area have had a comparatively short period to carry out much work, but this year a good 2 months of that time have been lobbed off by the winter season. The usual swing of activity with drilling rigs and exploration units moving into the north (in October as a rule) has been delayed at least 2 months in most cases.

With the recent rise in temperature in the area, firms with equipment located on wellsites and exploration tracts are naturally worried about keeping units and men supplied. Temperatures low enough to thoroughly freeze the muskeg did not come in advance of the snow in many regions. As a result this white material, which as a rule packs into smooth roadbeds for winter operations, is acting this season as an insulator and delaying further freezing of the muskeg.

An early January survey of drilling operations in western Canada revealed that 242 rotary drilling rigs were on the active list. That score included 108 rotaries on field-development wells and 134 at wildcats. As of the end of last week another quick check showed at least 70 drilling rigs working at wildcats in the northern part of the province.

Under normal winter-working conditions, the number of rigs now located within the northern area would likely be enough to meet required drilling commitments. With the season getting shorter and shorter, however, more rigs are scheduled to move to the region for an accelerated program as soon as possible.

ALBERTA

Blood Indian Discovery Completed Successfully

Pan American Petroleum Corp.'s Blood Indian Reserve indicated-oil discovery well, reported some time ago as having recovered small amounts of oil during drill-stem test in the Mississippian horizon, has been completed successfully as a commercial oil well.

The venture, in the southern sector of Alberta 115 miles south of Calgary and 20 miles southwest of Lethbridge, is flowing at the rate of 130 bbl. per day; however, some of that is still load oil, spent acid water, and formation water. The company is carrying out further production tests at present and it has been rumored that the flow rate is still increasing from an initial rate of 72 bbl. in 23 hours up past the 130 bbl. per day flow rate mentioned earlier. It is thought that the water content in the flow will get no lower than between 5-10 per cent but it is still far better than the reported 33 per cent that was recovered during the first test.

Pan American A-1 8-23-6-24 Blood Indian Reserve, was drilled on LSD 8, 23-6-24w4. A 57-ft. gross pay thickness has been estimated in the Mississippian horizon around the 6,300-ft. mark and after production casing was set two separate intervals totaling 35 ft. were perforated and acidized. Initial flow rate of 72 bbl. in 23 hours was recovered through a ½-in. choke while the next test, which actually gave up 114 bbl. in 21 hours, or 130 bbl. per day, was also through a restricted choke. On the initial test gas-oil ratio measured 4,000 cu. ft. per barrel but no figure on the latter test to that extent was given.

This discovery well was drilled by Pan American on petroleum and natural gas rights acquired from National Petroleum Corp. and Associates. The drilling company holds a spread of 114,000 acres under agreement from National, which is subject to an override royalty to that group. In addition to that spread, Pan American recently acquired a further 16,000-acre tract from Imperial Oil, Ltd., and the initial test on it is scheduled to get under way shortly.

SASKATCHEWAN

Lodgepole Strike Reported at Antler

Another Lodgepole oil success in the southeastern portion of Saskatchewan is indicatd by Imperial Oil, Ltd.'s recent wildcat test in that region of western Canada. Actually the well is in the Antler area, 30 miles northeast of oil production in Carnduff field. Drill-stem test in the Lodgepole sector which indicated the success was reportedly run 20-ft. interval below 3,089 ft. and a pipe recovery consisting of 120 ft. of heavily oil-cut mud, 270 ft. of free oil and 60 ft. of salt water was made.

The well, Imperial-Mobil et al 4-13-7-30, on LSD 4, 13-7-20w1, lies 4 miles northeast of the Mobil-Woodley-Sinclair X9-29 East Bellegarde Mission Canyon oil discovery well and 16 miles southwest of Lodgepole oil success in Daly field of southwestern Manitoba.

Crew of the drilling rig operating on the well was waiting on orders at last report.

Further Details Announced On Spring Symposium

The program committee of the Second International Williston Basin Symposium to be held in Regina, Sask., April 23-25, 1958, has confirmed to date 15 papers to be presented at the meeting which is sponsored jointly by the Saskatchewan and North Dakota geological societies. The papers range from pre-Devonian stratigraphy of the Williston basin to the importance of geology in secondary recovery considerations in the Steelman area of Southeast Saskatchewan.

Three papers discussing the use of aerial photos as an aid to subsurface interpretation will be presented by Mollard, Blanchett, and Kupsch. These authors have done extensive research on this subject.

The entire technical program will be keynoted by Dr. T. A. Link, past president of the AAPG.

APPALACHIAN

PENNSYLVANIA

Another Well Added to Clearfield County Area

Devonian Gas & Oil Co. announced the completion of its fourth gas well in Union Township, Clearfield County, during the past 7 months. The latest well is the 2 Emory Miller. It was completed early in December with an open flow of 12-15 M.M.c.f. per day.

The new well extends the field to the northwest and may set off additional drilling. This field was quite active in 1957. Devonian plans to drill a number of wells during 1958 in the Clearfield County area.

OHIO

300-Bbl. Well Finaled In Tiverton Township

Smith Petroleum Co. moved across the township line into Tiverton Township, Coshocton County, and completed a 300-bbl. well after fracture on 1 Clyde Wolfe in Lot 1. Clinton sand was found at 2,997-3,054 ft. with 3 bbl. natural.

● In Section 21, W. E. Shrider's 4 Mullett gaged 300 bbl. in 24 hours after fracture.

Washington Gas Area Moved South

The gas pool in southwestern Washington Township, Coshocton County, was extended ⅓ mile to the south by Ohio Fuel Co. 1 M. L. Welker, Lot 19. Clinton sand at 3,328-70 ft. gaged 1,940 M.c.f. after fracture.

Newton Township Well Makes Oil and Gas

In a 6-hour test after fracture, Busk & Waters 2 (3) Eugene Good, Section 25, Newton Township, Muskingum County, made 300 bbl. oil with a gas volume of 2,750 M.c.f. Clinton was topped at 3,808 ft. and drilled in to 3,860 ft.

CALIFORNIA

New Test Slated for South Mountain

Universal Consolidated Oil Co. will drill 1 Harvey-Snyder in the South Mountain field area on a site of two earlier producers which were abandoned when earth movement along the Oakridge fault collapsed the casing. The Universal test will use the same drill site as Shell Oil Co.'s 2 Shell-Universal Consolidated Harvey in NW NE 13-3n-21w about 1 mile northeast of the Bridge pool activity. Both 1 and 2 Shell-Universal Consolidated Harvey tapped a Pico sand pool, Pliocene age, in various intervals between 6,500 and 8,128 ft. Both were abandoned last September when the earth movement collapsed the casing.

Standard-Western Slates Fillmore Area Wildcat

Standard Oil Co. of California, Western Operations, Inc., is grading location for a wildcat in SW SW 4-4n-19w, 3 miles northeast of Fillmore field in Ventura County. The location is in the steep hills above the fast-developing deep Fillmore field.

Big Oxnard Well Indicated

Reserve Oil & Gas Co. reported its third test in Oxnard field, Ventura County, looks like the top producer this far. On a formation test of the interval 6,445-6,530 ft., with a 1,400-ft. nitrogen cushion, gas surfaced in 21 minutes, fluid in 24 minutes after the tool was open 1 hour. The well flowed at a test rate of 2,400 bbl. daily of clean 24.2°-gravity crude through a 38/64-in. choke. Reserve was opening the hole, total depthed at 6,530 ft., preparatory to running 7-in. casing. The well is 3 Duntley.

MICHIGAN

Two Deep Wildcats Will Be Stopped

Abandonment orders were issued for two closely watched deep tests in Michigan. Don F. Rayburn 1 House SE SE NW 26-16n-4w, Vernon Township, Isabella County, bottomed at 5,118 ft. after logging Sylvania objective at 5,070 ft. Zone was dry. Located off old Vernon Dundee oil field, test carried show of oil at 4,535-50 ft. in sour zone of Detroit River.

E. Edwin Brehm 1 Reed SW SW 18-4s-1w, Liberty Township, Jackson County, originally drilled to 3,089 ft. in 1953, was deepened to 4,235 ft., largely as a result of recent success in Trenton formation in Hillsdale County. Brehm wildcat logged Trenton at 3,828 ft. but failed to carry oil.

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When faced with a treating problem on either a new or an old well, consult your Dowell engineer. Let him help you decide on the best treatment. Take advantage of the 25 years' experience of the people who *first* brought acidizing to the oil fields. Call any of the 165 Dowell offices and stations in the United States and Canada. In Venezuela call United Oilwell Service. Dowell Incorporated, Tulsa 1, Oklahoma.

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IN KNOTT COUNTY, KENTUCKY, Stabilized Acid —an exclusive Dowell service—has proved successful in the Big Lime Field, where many wells have actually shown decreased production when treated with other acids. Dowell uses 2000 gallons regular acid, followed by 2000 gallons of acid containing a special stabilizing agent. This relatively low-cost treatment is being accepted as standard in the field.

OKLAHOMA

PANHANDLE

South Glenwood Gas Well Completed By Shell

Shell Oil Co. completed an extension well on the southwest side of South Glenwood field in Beaver County. The new producer is the 1 Lonker-C, C SW NE 1-5n-27eCM.

The Shell well flowed 28,000 M.c.f. of gas per day plus 6.2 bbl. of condensate per million.

SOUTHEAST

First Offset To New Coal Discovery Set

The first offset try to a newly opened basal Oil Creek-Ordovician pool in Coal County was announced last week. It will be the Atmar Drilling Co. 1 Brown, SE NE NE 3-2n-8e.

The discovery well is the 1 LaFever in SE NE NE 3, 40 acres south of the new well. This well will be dually completed in the basal and upper Oil Creek sand. The operator swabbed 120 bbl. of oil per day from the basal Oil Creek at 4,754-62 ft. The Cromwell sand also showed for commercial gas production at 3,075 to 3,195 ft.

ATMAR DRILLING CO. will drill 1 Brown 40 acres north of its recent 1 LaFever basal Oil Creek discovery in Coal County, Southwest Oklahoma.

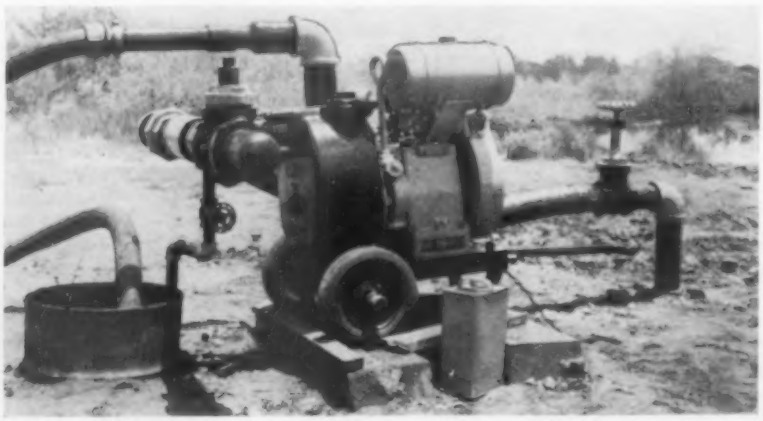
NORTHWEST

Deep Wildcat Slated For Laverne District

A 10,300-ft. wildcat that may find the Arbuckle was announced for the southwest side of big Laverne gas field in Harper County. It will be Sunray - Mid-Continent Oil Co. 1 Klinger in C SE NW 12-25n-26w.

This deep test, one of the deepest in the region, will be located south of Sunray 1 Pryor, an extension discovery of last summer in the southwest portion of Laverne field. The Pryor discovery had a calculated open flow

SUNRAY MID-CONTINENT Oil Co. will go to 10,300 ft. at 1 Klinger, Harper County wildcat. This will take it probably to the Arbuckle. Monsanto Chemical Co. 1 Doby is an indicated Morrow gas discovery 6 miles east of Northwest Doby Springs field in Harper County. Pan American Petroleum Corp. 1 Moore, Ellis County discovery, flowed 9,614 M.c.f. of gas on latest tests at 9,538-43 and 9,565-70 ft.



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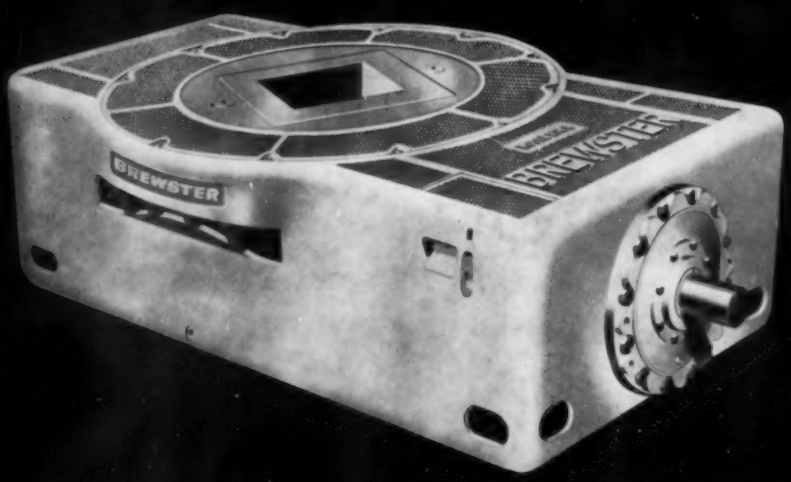

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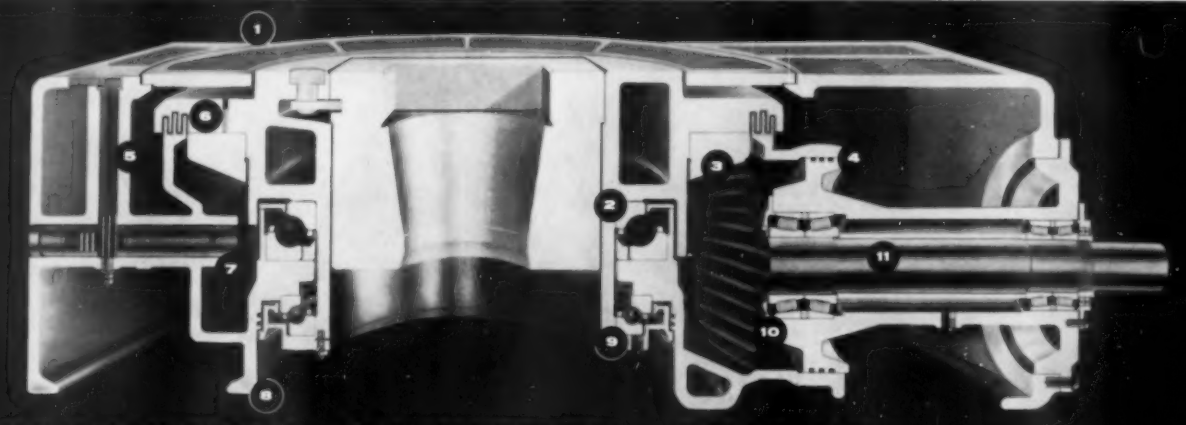

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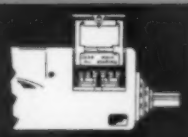

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of 17,000 M.c.f. of gas per day from perforations in the Hoover sand at 4,404-25 ft.

Southeast Stockholm . . . This booming field added another producer at Champlin Oil & Refining Co. 1 Madsen, C SE SE 19-26n-23w.

The well flowed 48 bbl. of oil per day on 18/64-in. choke from lower Tonkawa sand (Pennsylvanian) at 5,647-52 ft. Gas-oil ratio was 1,064:1.

New Harper pool . . . A new Morrow - Pennsylvanian gas pool was found in Harper County at Monsanto Chemical Co. 1 Doby, NE SE NW 1-27n-24w, 6 miles east of Northwest Doby Springs field and northwest of the town of Buffalo.

On drill-stem test at 6,125-60 ft. the well flowed as much as 10,250 M.c.f. of gas daily.

Ellis County . . . Pan American Petroleum Corp. 1 Moore, C SE NW 14-21n-23w, new Ellis County discovery, made 9,614 M.c.f. of gas per day during the first hour of gage on a test at 9,538-43 and 9,565-70 ft. During the next hourly tests it flowed 7,136 and 6,452 M.c.f. per day.

Cedardale . . . Testing continues at Shell Oil Co. 1-24 State, C SW NE 24-22n-17w, new-pay discovery in Northeast Cedardale pool, Woodward County.

The well flowed 2,000 M.c.f. of gas per day from perforations at 6,310-62 ft. from Mussellem. Gas was also found in the regular field pay, the Chester, at 7,165-80 ft.

WESTERN

SHELL OIL CO. 1 Britton, Cordell-area wildcat in Washita County, will be deepened to 17,000 ft. Springer was called at 14,500 ft. at the well; logs were run at 14,995 ft. Oklahoma's candidate for the world's deepest hole, Howell, Elliston et al. 1 Anadarko basin in NW NW SE 4-9n-12w, Caddo County, is drilling below 6,224 ft. This one is due to dig to the 24,000-ft. mark.

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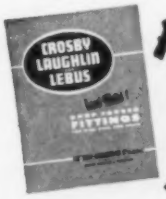

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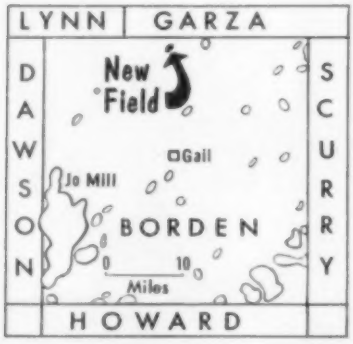
TEXAS

WEST TEXAS

Confirmation, Plus New Pay In Borden County Field

Second test in the newly opened Lazy S field in northern Borden County has extended Ellenburger production to the east, and has recovered oil from two sections in the Pennsylvanian.



LAZY-S ELLENBURGER field in northern Borden County was assured a second well, plus a new-pay prospect.

The confirmation well and new pay discovery is Shell Oil Co. 1 B. A. Slaughter estate, in Section 51, Block 30, T6N Survey. Operators reported first Ellenburger oil came following a core cut at 8,639-42 ft., when it started kicking and then headed oil and mud. Two subsequent drill-stem tests, at 8,642-52 and 8,652-62 ft. recovered oil.

A 2-hour drill-stem test in the Ellenburger at 8,662-72 ft. recovered 6,900 ft. of 42°-gravity oil. Flowing pressure reached 2,350 psi., shut-in pressure in 15 minutes was 3,948 psi. Operators cored an additional 10 ft. of dolomite to 8,682 ft., then had flowing oil on test of the interval between 8,672-82 ft. Oil surfaced in 45 minutes and gaged 25½ bbl. in the next 45 minutes through 1-in. choke.

Delaware Prospect In Reeves County

Ford Chapman & Associates 1-4 McMillen, in northwestern Reeves County, ran casing for completion attempt. The wildcat topped Delaware lime at 2,655 ft., and Delaware sand with oil show at 2,701 ft. Operators drilled to 2,910 ft., then bailed from 4 to 5 gal. of oil an hour. Location in Section 4, Block 57, Township 2, T&P Survey, is 4 miles northwest of Orla, 1 mile southeast of Sullivan-Delaware field and 2 miles northwest of a 3,245-ft. dry hole.

Delaware sand drilling and exploration programs have been greatly expanded over the past several months. Work has been concentrated in Loving and Reeves counties and the northeastern corner of Culberson County.

KANSAS

EASTERN

New Field Indicated At Wabaunsee Wildcat

William Gruenerwald 1 Ashburn, NW NW SE 29-14s-10e, 4 miles south of Davis Ranch pool and 2½ miles north of the town of Chalk in southern Wabaunsee County, recovered 1,275 ft. of oil with no water on a drill-stem test of the Viola at 3,255-62 ft.

SOUTHWEST

Potential Awaited at New Comanche Discovery

Capitt Drilling Co. et al 1 Robinson, new Comanche County discovery ¾ mile northwest of Mule Creek pool, flowed 50 bbl. of oil in 4 hours. The operator is now waiting on potential. Pay is in the Mississippian at 5,084-90 ft.

Winfield Discovery Completed in Hamilton

A new gas discovery has been completed in Hamilton County, 13 miles north of Syracuse in extreme western Kansas. The new pool-opener is Kansas-Nebraska Natural Gas Co. 1 Wedel, C NE NW 1-22-41.

This gas strike, a Winfield producer at 2,739-74 ft., flowed at the daily rate of 2,600 M.c.f. The Winfield is a member of the Chase Group of Permian age.

MISSISSIPPI

Deep Test at Soso Logs Cotton Valley Showings

Hopes for Jurassic-Cotton Valley production in South Mississippi are being enlivened by good oil showings encountered in Gulf Oil Corp.'s deep exploratory test in Soso field. They are the first definite oil showings ever reported in the Cotton Valley in Mississippi. Only a relatively few tests in South Mississippi have drilled to that horizon, although there are two gas

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wells in the deeper Smackover zone at Loring, a little farther north and west.

Gulf's well is its 1-Z. B. Soso Field Unit, on the Jasper County side of the three-county field, which has been Mississippi's most prolific producer in Lower Cretaceous Rodessa and Bailey (Sligo) sands at depths of 11,000 to 12,000 ft. It logged top of the Cotton Valley at 13,765 ft., and had a drilling break at 15,214-20 ft. where it circulated sand with oil shows. From cores at 15,220-77 ft., it recovered 26 ft. of sand with good oil odors and stains, 3 ft. of tight sand with shows, another 7 ft. of more porous sand with shows, and 2 ft. of tight sand with shows. Porosity ranged from 6 to 23 per cent. Saturations were sufficient to indicate production.

In addition to having the Rodessa and Bailey oil sands, Soso has proved gas productive in the higher Lower Cretaceous Paluxy zone, and in Upper Cretaceous Eutaw sands.

Rodessa Producer Opens Second Eucutta Deep Pay

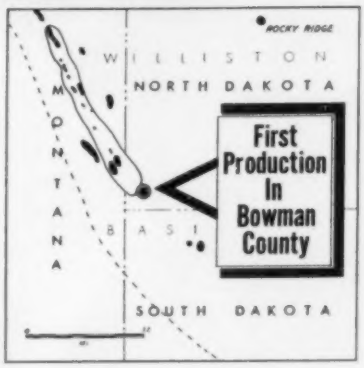
Rodessa sand is showing for production as the second Lower Cretaceous discovery in Wayne County's Eucutta field within 2 months. First Lower Cretaceous discovery was in Paluxy sand. All previous production in the field, discovered in 1943, had been from Upper Cretaceous-Eutaw sands.

The Rodessa discovery is in Gulf Oil Corp.'s 1 Eucutta Unit 9, a little more than ½ mile northwest of this company's Paluxy discovery well, 1 Green, completed last November. Testing perforated interval at 9,815-16 ft., the well flowed 107 bbl. of 49.5°-gravity oil in 23 hours through ⅛-in. choke. Flowing pressure was 1,830 psi.

Hole had been drilled to 10,725 ft. Top of the Rodessa was logged at 9,783 ft. from elevation of 340 ft. Perforated interval is near the bottom of the zone. Pay of the Paluxy discovery well is perforated at 8,067-69 ft. The field's Eutaw sands range in depth from 4,900 to 5,300 ft.

Two other Lower Cretaceous tests are active in the field. Gulf's 1 Eucutta Unit 1, nearly 1 mile southeast of the Paluxy discovery well (1 Green), has drilled into salt at 11,804 ft. Hole probably will be carried a little deeper in the salt before being plugged back to test possible Lower Cretaceous pays. Humble Oil & Refining Co., at 16 Gulf Mobile & Ohio, is getting well down as a direct east offset to Gulf's Paluxy discovery.

NORTH DAKOTA



First Production Opened In Bowman County

The new exploratory year in North Dakota has produced its first highly significant discovery. Carter Oil Co. opened first production on the North Dakota section of the Cedar Creek anticline, and also first production for Bowman County in the extreme southwest corner of the state.

The 1 Johnson, C NW SW 9-129n-106w, swabbed 195 bbl. of oil and 17 bbl. of basic sediment and water in 24 hours on test of the Red River-Ordovician at 8,206-21 and 8,231-48 ft.

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"I despise this sort of thing."

Nickerson Takes Socony Helm

. . . as chief executive officer. A young man who came up through marketing, he has the "integrated" view today.

HARVARD GRADUATE Al Nickerson went to work as a $19-a-week pit man in a Socony Mobil Oil Co. service station at Brookline, Mass., in 1933.

Three years ago, at the age of 44, he was elected president of the vast integrated oil firm. On February 1, at 47, he will take over as chief executive officer.

The rapid rise of Albert L. Nickerson to the helm of Socony Mobil was no accident. He's a man who moves in a hurry, and, in the words of an associate, can "spot the kernel in the corn faster than anyone I know."

Another Socony executive reported the success story this way: "I tried to follow him around a refinery one day shortly after he became a director (at 35). He ran my tail off. When the day was over, he was speaking the refiners' language, and there was damn little about that plant he didn't know."

First, a salesman . . . Since Nickerson started out as a service-station attendant, it was normal for him to advance at Socony through the marketing division of the company. His development as an "integrated" oil man came later.

He spent his first 3 years as an attendant, shift manager, and station manager, fixing flats and pacifying impatient customers. By 1936 he had been spotted as a "comer" and was picked for management development.

First he became a general salesman and in 4 years was district sales manager at Brockton, Mass., near his home town of Dedham. His division piled up the biggest gains of all New England districts, and in 1941 he won promotion to New England division manager.

During World War II, Nickerson went on loan to the War Manpower Commission as director of the placement bureau. Later he returned to his division managership at Brockton, and then moved to New York as assistant general manager of the eastern marketing division.

Next came an important shift that started his conversion to an "integrated" oil man and made possible his rise to the helm of Socony. The company sent him to England to help rebuild Socony Mobil's Great Britain affiliate, Vacuum Oil Co., Ltd. As board chairman of Vacuum he developed plans which produced a comeback to prewar eminence for the company.

Up to now . . . By November, 1946, he was back in New York as a member of the parent company's board of directors. His "portfolio" was "executive in charge of domestic marketing," but his thinking was company-wide. Five years later his portfolio was foreign trade, and he was elected a vice president.

When Socony's president, B. Brewster Jennings, moved up to chairman of the board in July, 1955, the 44-year-old Nickerson became president. Jennings retained the job of chief executive officer.

In the latest shift at Socony, Jennings will retire, and Nickerson will become chief executive officer as well as president.

Fred W. Bartlett, vice president for producing and a director, will step in as chairman of the board. Bartlett, 60, spearheaded Socony's move into Venezuela early in his career with the company.

Out of the rut . . . Associates say that

Personals

Fred L. Oliver and **Frank West** have set up a new consulting firm, Fred L. Oliver & Associates, Dallas, to specialize in petroleum engineering, geology, valuations and appraisals, and oil and gas property management. Oliver was with DeGolyer & MacNaughton, Dallas, the past 5 years and previously worked for Petty Geophysical Co., Robertson Drilling Co., and Pan American Petroleum Corp. West is trustee for the estate of J. B. Stoddard, independent operator, and will retain that position. He joined Stoddard as assistant manager and chief engineer in 1953. Prior to that he worked for Continental Oil Co. in California, Oklahoma, and Texas.

Harry M. Halsell has resigned as West Texas manager of Texas Iron Works to join Denver Drilling Co., Odessa, Tex., as vice president in charge of drilling operations. Halsell was with Texas Iron Works for 7 years. Before that he worked for Atlantic Refining Co. and M. J. Delaney Co.

Jerry B. Allen, field engineer, has been transferred to New Town, N. D., from Rangely, Colo., by Pan American Petroleum Corp.

one key to Nickerson's success at Socony has been his ability to question the time-honored way of doing things and not hesitate to break tradition.

He demonstrated this trait after World War II when the company faced the problem of what to do about its heavy losses of refineries and markets overseas. These represented the company's traditional lines of business.

B. B. JENNINGS

F. W. BARTLETT

The decision was this: Make the search for crude oil reserves pre-eminent in the company operations. Socony decided that the man to "sell" this idea to the traditionally-strong marketing department was the man who grew up in it, Al Nickerson.

Despite his youth, Nickerson knew how to be popular with the old-line marketers. This quality was important when personnel and policies had to be changed.

He also instituted the policy that each marketing district should go on a profit-and-loss basis. Profit, not volume, was the basis of decisions.

If anyone has an objection to a company making a profit, Nickerson has the reply. His contention: "I suspect that very few people indeed realize that profits, over a period of time, are the only true measure of efficiency in a competitive, free-enterprise economy such as our own."

Nickerson lives unpretentiously with his wife and four children in Rye, N. Y. He's a physical fitness enthusiast and rows as a hobby, a throwback to his college oarsman days.

Paul R. Schultz, president of Blackwell Oil & Gas Co., Tulsa, was re-elected president of the Oklahoma Independent Petroleum Association at the group's third annual meeting in Tulsa last week. Other reelected officers include **Erritt Dunlap,** Ardmore, vice president, and **Carl B. Anderson, Jr.,** Oklahoma City, secretary-treasurer. Newly elected directors are **John J. Robertson,** Shawnee; **E. A. Smith,** Tulsa; **Harry J. Schafer, Jr.,** Oklahoma City; and **J. H. Arrington,** Thomas N. Berry & Co., Stillwater. Newly elected alternate directors are **Ross Porter** of KGFF Oil Co., Shawnee; **Max B. Schrier** of Service Producing Co., Tulsa; **Jack A. Griffith,** Stillwater; and **Paul T. Morrell,** Gilmer Oil Co., Ardmore.

A. E. Crouse, coordinator of plant operations at Continental Oil Co.'s headquarters production department, Houston, has been transferred to Constock Liquid Corp., new Conoco affiliate.

R. P. Evans, vice president of Kin-Ark Oil Co. in charge of exploration, has transferred from the company's headquarters in El Dorado, Ark., to the new exploration department offices in Shreveport, La. Also transferring to Shreveport are **Bill M. McLarry,** geologist, and **H. Fred Futch,** landman. McLarry recently joined Kin-Ark. He was formerly district geologist in Billings, Mont., for Lion Oil Co.

Lester M. Snyder, vice chairman of the board of Aramco Overseas Co., has been elected chairman and chief executive officer of the company. Snyder is a vice president of Arabian American Oil Co., the parent company. He will continue to headquarter in Dhahran, Saudi Arabia. Snyder joined Standard Oil Co. of California in 1931. Eight years later he went to Saudi Arabia as chief engineer for Aramco. He was named a vice president in 1949.

Erich R. Westfield has left Houdry Process Corp., where he was chemical engineer in Marcus Hook, Pa., to join Tidewater Oil Co. in Delaware City, Del., as analyst in the economic planning department.

Bryan C. Edwards has been named Canadian division gas superintendent for Pan American Petroleum Corp. Edwards has been in Calgary since 1956 and has been active in planning and design of the Pembina gas conservation project. He has been with Pan Am since 1947.

J. P. Markey, superintendent of Continental Oil Co.'s Wichita Falls, Tex., refinery, has been transferred to Lake Charles, La., as assistant superintendent of the refinery there. **M. H. Clark,** assistant superintendent at Lake Charles, succeeds Markey as superintendent in Wichita Falls. The changes are in line with Conoco's managerial-development program of job rotation.

Personals

W. L. BOYER

William L. Boyer has been named to succeed **John P. Hurndall** as president and a director of Bandini Petroleum Co. Boyer has been executive vice president of Bandini and was formerly general manager of the Richard S. Rheem oil interests. Hurndall, who resigned as president, will continue as a consultant to Bandini and will devote most of his time to operations of the company's concessions in British Honduras and Guatemala.

R. S. Randerson, Jr., has been transferred by Tennessee Gas Transmission Co. from Bellaire, Tex., where he was assistant production manager, to Houston as production department coordinator. **Morris E. Kittleson,** formerly production engineer for Merrill Petroleums, Ltd., Calgary, has been named petroleum engineer for Chaco Petroleum, S.A., TGT subsidiary. He will headquarter in Cochabamba, Bolivia.

Fritz L. Aurin, executive vice president of Southland Royalty Co., has retired after 25 years with the company. He stepped down as president of Southland in 1955 in anticipation of retirement. Aurin was vice president and chief geologist of the old Marland Oil Co. before joining Southland. He is a past president of American Association of Petroleum Geologists.

Dale Goodrich has been named exploration manager and chief geologist for El Dorado Refining Co. He succeeds **Max Houston,** who has resigned.

BEARDMORE

Herbert F. Beardmore, formerly vice president of production for Warren Petroleum Corp., has been named Houston district manager for Gulf Oil Corp. He succeeds **Walter A. Shellshear,** who was recently transferred to Roswell, N. M., as district manager. Beardmore, a graduate of the University of Oklahoma, had been vice president of Warren since 1955. He was with Amerada Petroleum Corp. and Barnsdall Oil Co. before joining Warren in 1947.

Personals

E. S. HORAER

E. S. Horner, manager of refining for Bell Oil & Gas Co., has been named vice president in charge of refining. Horner has also been superintendent of the Ardmore, Okla., refinery of Ben Franklin Refining Co., subsidiary of Bell. He will be succeeded in this position by **L. K. Buchanan,** associate superintendent of the Ardmore refinery. Horner joined Bell in 1930. He became superintendent of the Ardmore refinery in 1938 and manager of refining in 1955. Buchanan joined the company in 1939.

Wilson N. Gilliat, chief engineer for Williams Brothers Co., has been promoted to assistant vice president-engineering. **Charles J. Flint,** assistant chief engineer, moves up to chief engineer. A graduate of Massachusetts Institute of Technology, Gilliat joined Williams Brothers in 1954. He had been with Great Lakes Pipe Line Co., Burns & McDonald Engineering Co., and C. F. Braun & Co., before that time. Flint has been with the company since 1955. He is a graduate of the University of California.

R. E. Warner has been named vice president in charge of primary production for Forest Oil Corp. Warner joined Forest in 1930 in Bradford, Pa. He has been in the Texas area since 1936. He is a graduate of the University of Pittsburgh.

Doyle F. Cheatwood, assistant district production foreman at Yale, Okla., for Sinclair Oil & Gas Co., has ben transferred to Sinclair Canada Oil Co. in Edmonton as district production foreman.

Benjamin B. Weatherby, W. T. Born, Andrew Gilmour, and **Paul L. Lyons** were presented plaques at the January meeting of the Geophysical Society of Tulsa honoring all four as past presidents of the Society of Exploration Geophysicists. All are members of the Tulsa group. Weatherby, president of Geophysical Research Corp. and senior vice president and a director of Amerada Petroleum Corp., was SEG president in 1935. Born, vice president of Geophysical Research Corp., served as president in 1940. Gilmour was president in 1949. He retired as chief geophysical supervisor of Amerada in 1955 and is now a consultant. Lyons, chief geophysicist of Sinclair Oil & Gas Co., served as SEG president in 1952.

Claiborne A. Duval, assistant chief process engineer at Magnolia Petroleum Co.'s Beaumont, Tex., refinery, has been promoted to technologist, a new classification. The new post is equal in status to supervisory positions but carries no administrative duties. Magnolia will use it as another avenue of promotion for its technically trained personnel. Duval joined Magnolia in 1941. He had been assistant chief process engineer since 1955.

Jerry H. Doughman, formerly head secondary-recovery engineer for The Texas Co. in Tulsa, has joined Delhi - Taylor Oil Corp. as chief petroleum engineer in the production division. Doughman joined Texaco in 1940. He was transferred from South Texas to Tulsa as reservoir engineer in 1945 and was named head secondary-recovery engineer in 1949.

Hugh H. Beach has been promoted by The Texas Co. from chief geologist of the domestic producing department in Houston to assistant to the vice president, domestic producing department. He will headquarter in New York. Beach succeeds **S. A. Berthiaume,** recently named vice president and manager of Texaco Exploration Co., Calgary. **J. A. Rogers,** senior geologist in Houston, moves up to succeed Beach as chief geologist of the domestic producing department there. Beach was assistant manager of Texaco Exploration Co. before appointment to the parent company's domestic producing department in 1955. Rogers has been with Texaco since 1936.

H. H. BEACH

J. A. ROGERS

Dr. Nat C. Robertson has been named general manager of research and development for Spencer Chemical Co. He was formerly director and vice president of research for Escambia Chemical Corp. Robertson succeeds **Dr. John R. Brown, Jr.,** who has resigned.

DEATHS

Riley Elmer Andrew, 78, drilling contractor, died recently at his home in Nevada, Mo. He had formerly lived in Tulsa and Pecos, Tex., and operated in Oklahoma, Texas, Indiana, and Ohio. He also was a former general supervisor for Pure Oil Co.

Logan H. Bagby, 56, southern division manager of marketing operations for Richfield Oil Corp., died January 8 after a heart attack in his Los Angeles office. He had been with Richfield 20 years.

Carl J. O'Hornett, Tulsa independent, died January 10 after a 2-month illness. His son, Patrick U. O'Hornett, is president of Union Oil Co. of Oklahoma.

Horace Canon, 69, Bismarck, N. D., independent operator, died January 3 in Bismarck. Canon was vice president and general manager of Root Petroleum Co. in Shreveport, La., before moving to Bismarck as an independent in 1953 during early Williston basin development.

Harold R. Jeannerett, 69, pioneer rig builder in California's Signal Hill area, died January 5 in Long Beach, Calif. Jeannerett retired 2 years ago.

Samuel G. Hartman, 93, retired director and treasurer of South Penn Oil Co., died recently in St. Petersburg, Fla. Hartman began his oil industry career with Ohio Oil Co. in 1890 in Findlay, Ohio. He retired from South Penn in 1935.

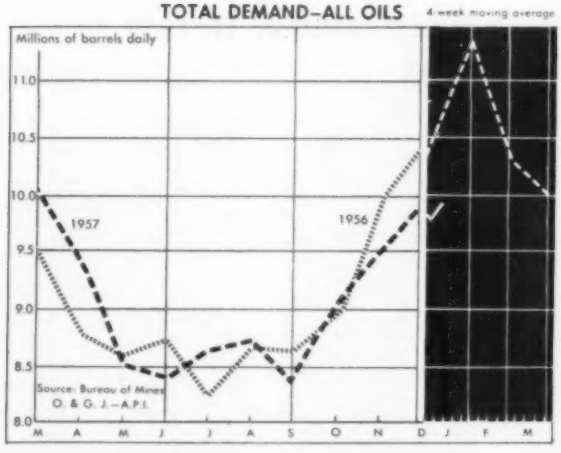
Charles Chester Durkee, 72, retired superintendent of Socony Mobil Oil Co.'s Fairfax, Mo., pipeline terminal, died recently at his home in Daytona Beach, Calif. Durkee was supervisor at Socony's Augusta, Kans., refinery at one time. He retired in 1946.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,867,025	UP	7,600	DOWN	587,949
Crude stocks	276,999,000	UP	766,000	UP	17,016,000
Completions	*1,403		(*)		(*)
Refinery runs	7,772,000	DOWN	95,000	DOWN	500
Gasoline stocks	198,738,000	UP	703,000	UP	9,495,000
Kerosine stocks	27,261,000	DOWN	1,250,000	DOWN	2,534,000
Distillate stocks	141,349,000	DOWN	8,672,000	UP	18,366,000
Residual stocks	58,257,000	DOWN	1,364,000	UP	15,530,000
Four-product stocks	425,605,000	DOWN	10,583,000	UP	40,857,000
Total imports	1,386,400	DOWN	271,500	DOWN	296,500

*Includes part of 2 weeks.



Lower Fuel-Oil Prices Reflect Weakness in West Coast Markets

A 20-CENT PER BARREL reduction in Bunker C fuel oil on the West Coast featured developments in domestic refinery markets over the past week. The decrease, effective January 10, resulted in a base price of $2.65 at refineries in the Los Angeles area.

Refined markets generally continued weak for domestic and export movement. The advance of 0.3 cent per gallon for distillate and kerosine along the East Coast by Socony Mobil Oil Co., Inc., on January 10 was not met by other major sellers and the company rescinded the advance the first of the week.

Additional Gulf Coast refiners have reduced their prices on No. 2 distillate ¼ cent per gallon to 8¾ cents. The high on this product at gulf points is now 9¼ cents.

There were no important changes in price levels for other products during the week. The market generally, however, is weak and concessions under the usual market quotations were available to important spot buyers. The concessions were as much as 1 cent in the case of gasoline and distillates and 10 or more cents per barrel for fuel oil.

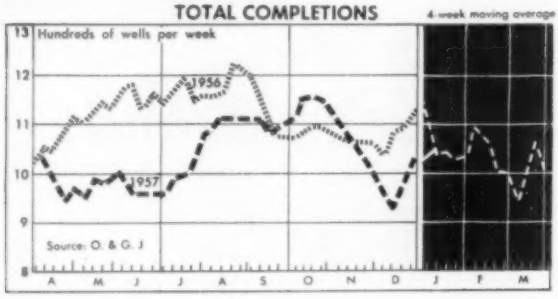
The reduction in fuel-oil prices on the West Coast reflects greater supplies in that section of the domestic market and also competition from other areas. Within the West Coast states the markets for all refinery products are dominated by excess supplies of crude oil, a development largely of recent months.

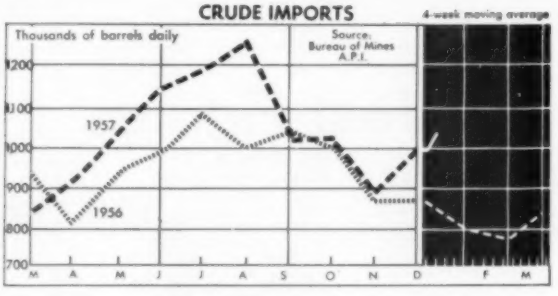
Further Drop Seen by One Marketer

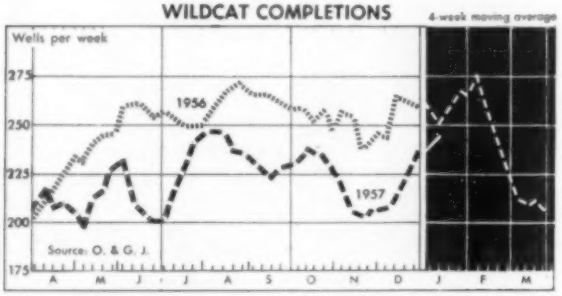
The head of a major integrated company operating on the West Coast, with current and future conditions in mind, predicts that markets will go lower before they recover from their present weakness. He foresees a weak refinery market extending into 1959 in that area.

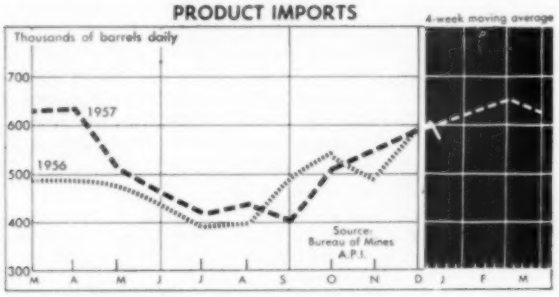
It is pointed out that the crude-oil availability situation will become more acute in the near future when a 16-in. pipeline from the Four Corners will be completed to refineries in the Los Angeles area. The line's initial deliveries will be 70,000 bbl. daily with an ultimate capacity of 170,000 bbl. daily.

In the domestic market refiners are concerned with the fact that developments in supply and demand have not justified advances in prices for distillates used as furnace oils. It is a common saying in refinery markets that the latest date for determining trends in distillate is January 15. With inventories about 17 million barrels or 13 per cent greater than a year ago, market observers are fearful that there is little chance of an upturn in prices over the remainder of the season even if lower-than-usual temperatures bring a pickup in shipments.







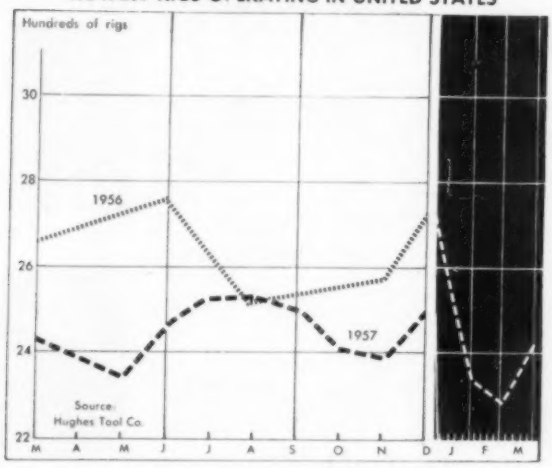


WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 11, 1958

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	2	1	0	0	1	0	19,420	4	0	1	0	0	0	1	2	0
Arkansas	12	6	0	2	4	0	53,802	25	34	2	0	0	1	1	4	6
California	42	28	0	0	14	0	190,646	82	87	7	0	0	0	7	14	27
Colorado	9	2	0	2	5	0	50,895	20	65	3	0	0	1	2	8	43
Illinois	0	0	0	0	0	0	0	13	61	0	0	0	0	0	4	17
Indiana	8	4	0	0	3	1	13,356	19	22	0	0	0	0	0	4	7
Kansas	73	28	0	4	38	3	266,575	130	166	20	4	0	1	15	31	33
Kentucky	25	8	0	7	10	0	53,173	33	37	1	0	0	0	1	2	7
Louisiana	106	48	16	7	35	0	871,064	122	118	16	2	1	3	10	23	15
North	31	15	0	5	11	0	111,804	47	71	10	2	0	3	5	17	8
South	†57	24	11	1	21	0	574,714	57	38	†6	0	1	0	5	6	7
Offshore	†18	9	5	1	3	0	184,546	18	9	†0	0	0	0	0	0	0
Michigan	7	3	0	1	3	0	27,685	10	13	2	0	0	0	2	3	4
Mississippi	10	3	1	0	6	0	74,995	18	6	5	1	0	0	4	8	1
Montana	6	2	0	0	4	0	30,896	25	11	3	0	0	0	3	11	2
Nebraska	15	1	0	0	14	0	87,791	28	31	7	0	0	0	7	15	22
New Mexico	†89	41	0	25	23	0	404,742	89	48	†19	0	0	0	16	19	7
Northwest	43	12	0	23	8	0	175,082	43	27	9	0	0	2	7	9	4
Southeast	46	29	0	2	15	0	229,660	46	21	10	0	0	1	9	10	3
New York	15	5	0	1	4	5	34,705	25		5	0	0	1	4	5	.....
North Dakota	5	3	0	0	2	0	40,130	16	14	1	0	0	0	1	8	6
Ohio	0	0	0	0	0	0	0	10	37	0	0	0	0	0	0	0
Oklahoma	195	82	4	18	71	20	716,486	265	237	23	2	0	2	19	37	35
Pennsylvania	0	0	0	0	0	0	0	0	*13	0	0	0	0	0	0	*2
Texas	†752	384	35	35	289	9	3,406,615	752	848	†193	10	4	3	176	193	235
Dist. 1	40	17	0	4	19	0	131,487	40	55	16	0	0	0	16	16	28
Dist. 2	30	7	7	6	10	0	189,179	30	23	14	1	3	2	8	14	7
Dist. 3	63	27	7	6	23	0	414,670	63	72	12	0	0	0	12	12	22
Dist. 4	41	9	4	2	26	0	227,630	41	51	16	1	0	0	15	16	22
East	67	28	7	1	31	0	308,989	67	41	24	0	1	0	23	24	12
Dist. 7-B	85	30	1	2	52	0	278,309	85	96	33	3	0	1	29	33	40
West	221	170	0	0	50	1	1,109,373	221	253	35	3	0	0	32	35	30
Dist. 9	163	79	0	8	68	8	509,369	163	217	34	1	0	0	33	34	80
Dist. 10	42	17	9	6	10	0	237,609	42	68	9	1	0	0	8	9	13
Utah	1	0	0	0	1	0	3,357	5	7	1	0	0	0	1	2	6
West Virginia	9	0	0	7	2	0	19,259	18	34	0	0	0	0	0	0	3
Wyoming	15	3	0	4	8	0	96,302	31	44	8	0	0	2	6	12	16
S. D., Tenn.	7	0	0	2	5	0	12,659	8	7	7	0	0	2	5	8	1
Total U. S.	**1,403**	652	56	115	542	38	6,474,553	1,748	1,940	**324**	19	5	19	281	413	495
Total prev. week	510	240	5	22	232	11	1,977,277	.....	.....	131	6	1	4	120	.....	.....
Cum. 1958	1,748	791	58	127	728	44	7,604,453	.....	.....	413	22	5	21	365	.....	.....
Western Canada	42	27	0	1	14	0	180,515	82	40	12	1	0	0	11	23	.....

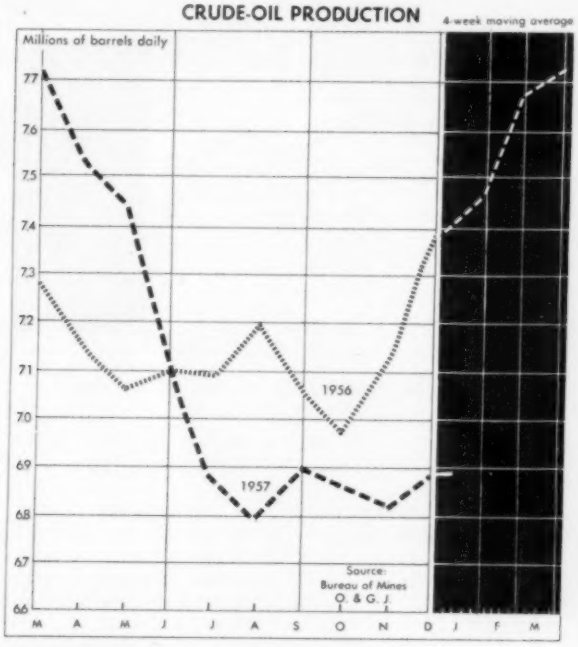
*Includes New York. †Figures include January 1-11.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL PRODUCTION

4-week moving average



ACTIVE ROTARY RIGS*

Area—	1-13-58	1-6-58	12-30-57	1-14-57
Alabama	8	8	8	12
Arkansas	16	18	16	20
Arizona	1		1	
California	91	91	94	102
Colorado	37	33	35	38
Florida	1	1	1	1
Georgia				
Idaho				1
Illinois	57	44	30	45
Indiana	3	3	4	5
Iowa	3	2	2	1
Kansas	113	118	138	154
Kentucky	6	8	6	10
Louisiana	356	374	377	431
North	37	35	39	44
South	246	261	260	283
Offshore	73	78	78	104
Maryland		1	1	1
Michigan	6	7	7	10
Missouri				
Montana	29	29	31	21
Mississippi	51	54	47	19
Nebraska	18	21	30	23
Nevada				2
New Mexico	116	129	142	110
New York	1	1	1	
North Dakota	40	43	47	29
Ohio	1	1	1	
Oklahoma	210	220	227	244
Oregon				
Pennsylvania	9	7	8	6
South Dakota	1	1	1	1
Texas	787	865	952	961
Gulf Coast	160	191	215	233
Offshore	2	3	2	6
West	312	335	352	352
North	265	285	324	311
East	48	51	59	59
Tennessee				
Utah	49	50	48	29
Washington		1	1	1
West Virginia	4	2	2	2
Wyoming	48	50	67	51
Virginia				
Total United States	2,062	2,182	2,325	2,330
Western Canada	202	189	192	226
Eastern Canada	2	2	1	
Grand total	2,266	2,373	2,518	2,556

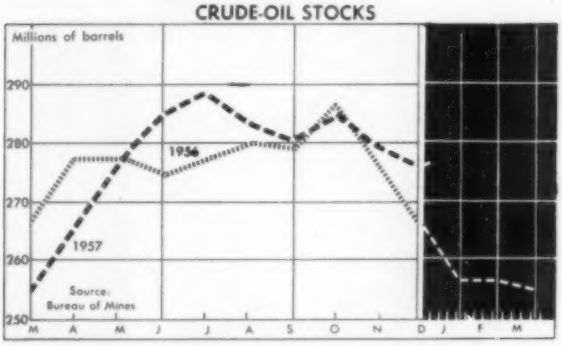
*Hughes Tool Co.

DAILY AVERAGE PRODUCTION FOR WEEK

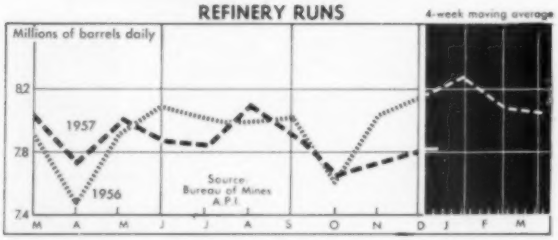
	January 11, 1958			
	Crude oil	Lease condensate	Total	Jan. 4 total
Alabama	15,250		15,250	15,475
Arkansas	83,100	250	83,350	83,025
California	927,200		927,200	928,600
Colorado	142,000		142,000	143,150
Eastern	51,400		51,400	51,800
Florida	1,275		1,275	1,250
Illinois	234,900		234,900	238,000
Indiana	30,400		30,400	31,400
Kansas	†318,100		†318,100	†320,400
Kentucky	40,800		40,800	41,500
Louisiana	755,875	90,100	845,975	844,800
North	111,825	2,600	114,425	114,425
South	644,050	87,500	731,550	730,375
Michigan	27,400		27,400	25,200
Mississippi	101,075	4,325	105,400	104,450
Montana	74,800		74,800	74,600
Nebraska	54,950		54,950	55,300
Nevada	150		150	150
New Mexico	262,425	5,700	268,125	264,850
North Dakota	36,900		36,900	34,500
Oklahoma	†558,200		†558,200	†562,200
Texas	2,665,000	60,100	2,725,100	2,720,475
Dist. 1	46,000	550	46,550	48,825
Dist. 2	119,000	9,400	128,400	129,550
Dist. 3	381,000	29,000	410,000	408,275
Dist. 4	197,000	6,400	203,400	203,400
Dist. 5	32,000	550	32,550	31,975
Dist. 6	117,000	7,000	124,000	119,425
East Texas field	161,000		161,000	160,425
Dist. 7-B	146,000	150	146,150	145,000
Dist. 7-C	147,000	4,075	151,075	153,350
Dist. 8	1,017,000	1,650	1,018,650	1,012,925
Dist. 9	198,000	725	198,725	203,300
Dist. 10	104,000	600	104,600	104,025
Utah	12,750		12,750	14,700
Wyoming	312,400		312,400	303,400
Others	‡200		‡200	‡200
Total U. S.	6,706,550	160,475	6,867,025	6,859,425
Charge from previous week, up			7,600	
Canada	†414,100		†414,100	†390,500
Total U. S. production, January 1-January 11				75,506,875 bbl.
Same period last year (crude plus cond.)				*82,059,040 bbl.

*Includes 1,619,360 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

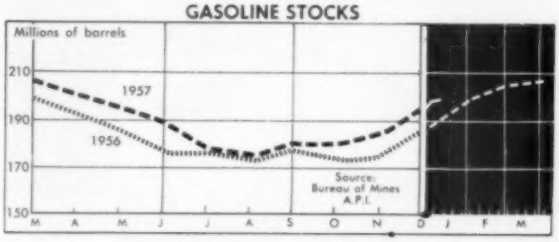
CRUDE-OIL STOCKS



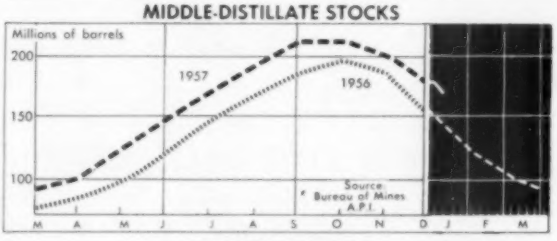
REFINERY RUNS



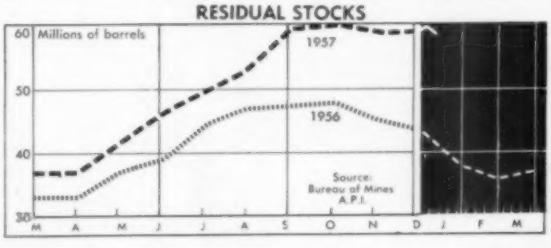
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*
(Thousands of barrels)

	1-4-58	12-28-57	1-5-57
Pennsylvania Grade	2,949	3,039	2,372
Other Appalachian	1,679	1,715	2,328
Illinois, Indiana and Michigan	11,516	11,481	10,837
Nebraska and North Dakota	2,291	2,437	2,220
Kansas	9,441	9,757	9,923
Oklahoma	19,764	19,756	22,825
Arkansas	2,805	2,766	2,864
Louisiana	19,852	19,448	18,635
North	3,163	2,801	3,083
South	16,689	16,647	15,552
Mississippi, Alabama, and Florida	2,444	2,545	2,761
New Mexico	9,742	9,502	7,827
Texas	121,246	122,418	114,969
East Texas	8,990	8,940	9,097
West Texas	53,509	55,255	53,340
Texas Gulf	24,798	24,792	21,998
Other Texas	33,949	33,431	30,534
Wyoming	14,121	13,641	16,028
Other Rocky Mountain	6,522	6,812	6,786
California	35,601	34,986	27,987
Foreign	†17,026	15,930	11,621
Total	276,999	276,233	259,983

*Bureau of Mines. †Includes 5,976,000 bbl. in California.

A.P.I. REFINERY REPORT, JANUARY 10, 1958
(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1957—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,150	489.3	31.0	358.3	195.4	43,782	11,797	55,531	12,528	1,214	505.7	39.9	370.5	244.6
Appalachian:														
District 1	96	38.3	4.7	20.4	11.1	5,195	572	2,771	715	103	40.6	6.3	24.0	9.5
District 2	87	51.7	6.2	18.3	10.3	2,717	420	1,113	501	111	53.3	6.9	20.7	16.7
Ind., Ill., Ky.	1,427	727.6	95.4	303.2	192.0	34,916	5,907	18,693	5,647	1,463	740.7	70.4	345.0	220.4
Minn., Wis., Dak	106	49.8	4.4	31.0	12.9	7,160	1,028	6,661	403	100	47.9	5.6	25.7	12.5
Okla., Kans., Mo.	748	405.0	19.4	192.4	42.0	17,858	1,067	11,106	1,354	714	395.7	16.6	184.8	41.5
Inland Texas	289	214.1	7.6	58.3	21.6	8,061	415	1,681	2,091	279	198.0	7.3	52.0	27.0
Texas Gulf Coast	1,794	893.1	130.6	483.4	227.7	26,802	2,623	16,198	5,804	2,033	914.6	135.1	595.8	257.6
La. Gulf Coast	622	343.0	49.0	136.7	32.9	12,033	1,900	6,813	1,249	704	346.5	62.1	218.6	61.1
N. La. and Ark.	99	33.3	8.7	22.7	6.7	4,894	784	1,884	222	101	41.1	9.4	24.7	8.9
Rocky Mountain:														
New Mexico	29	14.9	1.0	7.0	3.7	402	19	137	91	28	13.9	0.3	5.3	3.6
Other Rocky Mt.	263	130.6	2.6	66.1	37.1	6,558	329	2,804	980	286	137.2	2.4	66.6	41.0
West Coast	1,062	463.7	.....	186.3	307.3	28,360	400	15,957	26,672	1,138	504.0	4.9	184.4	377.9
Jan. 10, 1958	7,772	3,854.4	360.6	1,884.1	1,100.7	198,738	27,261	141,349	58,257	8,274	3,939.2	367.2	2,118.1	1,322.3
Jan. 3, 1958	7,867	3,941.6	369.9	1,891.4	1,127.4	198,035	28,511	150,021	59,621	.....	.....	.....	.....	.....
Jan. 11, 1957	8,272	3,953.9	380.3	2,056.1	1,331.3	189,243	29,795	122,983	42,727	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.25-11.75
Premium (98 octane)	14.00-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-11.00
Regular (92 octane)	10.75-11.25
Premium (97 octane)	12.25-12.75
Premium (98 octane)	12.50-13.00
California (rack) (Los Angeles):	
Regular (88 octane)	12.2
Premium (96 octane)	14.8
Premium (98 octane)	15.0
Caribbean area (cargoes):	
Regular (87 octane)	10.375
Premium (93 octane)	11.25

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.875-10.25
Diesel oil (58 d.i. and above)	9.50-10.00
Distillate No. 1	9.50-10.00
Distillate No. 2	8.875-9.25
Gulf Coast (cargoes):	
★ Kerosine 41-43	8.75-9.00
★ Distillate No. 2	8.75-9.00
New York Harbor (barges):	
Kerosine 41-43	10.75
Distillate No. 2	10.25
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.50-1.60
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
★ Bunker C fuel, Los Angeles	$2.65-2.80

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	27
200 vis. neutral (180° at 100°), 25 p.t.	25

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour) ($)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.81
16-16.9	2.74	....	....	....	1.86
17-17.9	2.78	....	....	....	1.91
18-18.9	2.82	....	....	....	1.96
19-19.9	2.85	....	....	....	2.01
20-20.9	2.89	$2.75	....	$2.62	2.06
21-21.9	2.93	2.77	....	2.64	2.11
22-22.9	2.97	2.79	....	2.66	2.16
23-23.9	3.01	2.81	$3.44	2.68	2.21
24-24.9	3.05	2.83	3.46	2.70	2.26
25-25.9	3.09	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Most buyers are posting Wyoming sour in two schedules, 15°-26.9° and 27°-40°.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
★ **Illinois Basin**	3.00-3.05
Canada:	
Leduc-Woodbend	2.74
Redwater (Alta.)	2.63
Smiley (Sask.)	2.40
Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.59
Iraq, 36.0°-36.9°, Tripoli, Banias	2.59
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

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(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC —17.5%)	$2.35
★ Gulf-U.S.N.H., dirty (USMC—27.5%)	2.07
★ Carib.-U.S.N.H., dirty (USMC —65.0%)	0.95
P.G.-Japan, dirty (USMC—60.0%)	3.60
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Write giving full particulars regarding personal history and work experience. Please include telephone number.

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OIL LEASES. Royalties, shallow drilling deals. Call or write, R. E. Clement, Box 65, Norman, Oklahoma.

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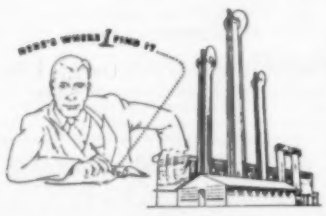

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U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, 1245 North 29th Street, Billings, Montana. Notice is hereby given that approximately 257.39 acres of land in two parcels within the known geologic structure of CEDAR CREEK FIELD in North Dakota and 1343.08 acres of land in ten parcels within the known geologic structure of KEVIN-SUNBURST FIELD in Montana will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount at 10:00 A.M., M.S.T., March 5, 1958 when bids will be opened. The following are the lands offered for sale: **CEDAR CREEK FIELD**, T. 130 N., R. 106 W., 5th P.M., North Dakota; **Parcel No. 1**, Sec. 21, Lots 8, 11, W½NW¼, containing 121.64 acres. **Parcel No. 2**, Sec. 28, SE¼NW¼, E½SW¼, Sec. 32, Lot 4, containing 135.75 acres. **KEVIN SUNBURST FIELD**, All lands in Principal Meridian Montana; T. 34 N., R. 2 W., **Parcel No. 3**, Sec. 6, Lots 1, 2, S½NE¼, containing 159.76 acres. **Parcel No. 4**, Sec. 6, Lots 3, 4, 5, SE¼NW¼, containing 151.41 acres. **Parcel No. 5**, Sec. 6, Lots 6, 7, NE¼SW¼, containing 111.91 acres. **Parcel No. 6**, Sec. 6, SE¼, containing 160.00 acres. T. 35 N., R. 1 W., **Parcel No. 7**, Sec. 33, W½SW¼, containing 80 acres. T. 35 N., R. 2 W., **Parcel No 8**, Sec. 2, SE¼, containing 160.00 acres. **Parcel No. 9**, Sec. 12, NE¼, containing 160.00 acres. T. 35 N., R. 3 W., **Parcel No. 10**, Sec. 27, SW¼NE¼, N½SE¼, containing 120.00 acres. **Parcel No. 11**, Sec. 27, E½SW¼, S½SE¼, containing 160.00 acres. **Parcel No. 12**, Sec. 34, NW¼NE¼, NE¼NW¼, containing 80.00 acres. Details of the lease offering, how and where to submit bids, may be obtained from the Manager of the Land Office, Bureau of Land Management, 1245 North 29th Street, Billings, Montana. Theo E. Anhder, Manager, Land Office.

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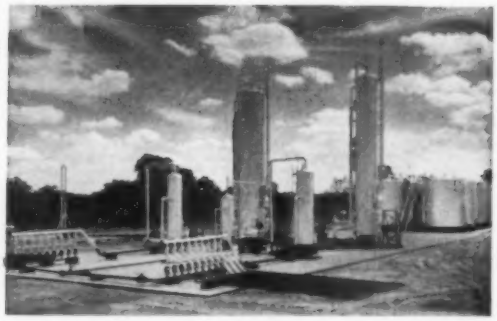

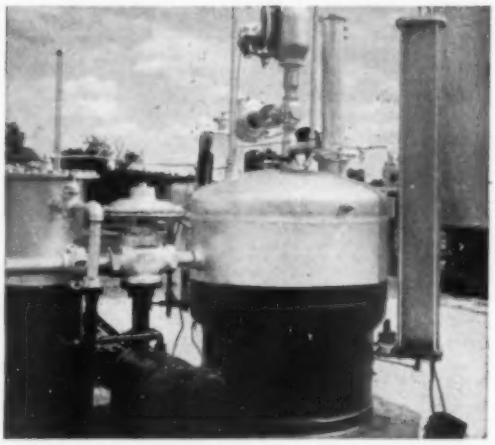

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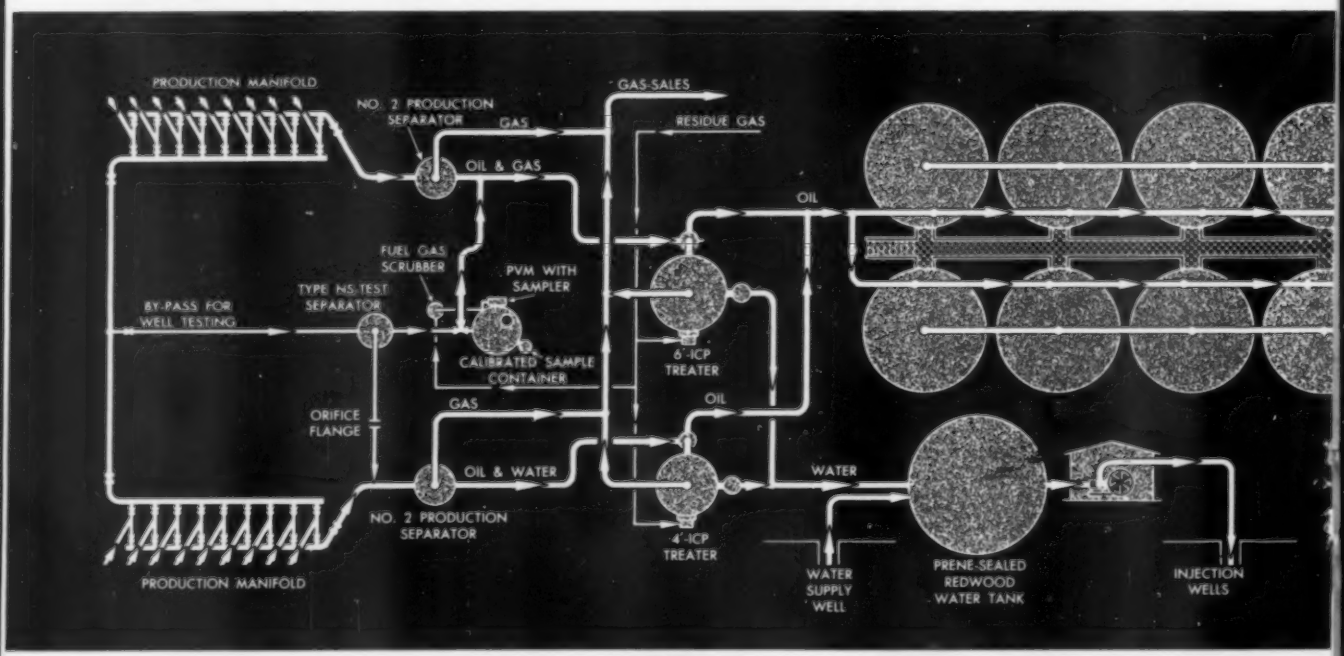

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